May, 1956

Vol. 45
No. 5

Industrial Arts and Vocational Education

Requisition Number

The Shop Teachers' Professional Magazine

THE LESSON OF THE BEES

Credit: Harvey Croze, Bloomfield Hills, Mich.

Man's ingenuity goes far. A science instructor at a school in Michigan noted that bees use *part* of the nectar they gather from flowers *to build the honeycomb* . . . and only the rest for making honey. This science instructor proceeded to build a *plastic* honeycomb for his bees—and sure enough the bees used *all* their nectar *and all their time* for making honey.

Man's ingenuity goes far. It cannot *prefabricate* the foundation needed by any schoolboy on his way to manhood's career. But it certainly can greatly help the boy avoid the mistakes that would delay him, that might lay waste to many productive years, that could cause unhealable wounds, could warp his personality and pervert his aims. It can help him arrive at the productive and fruitful years that much sooner.

Such is the goal of modern education. And every educator worthy of the name uses all the ingenuity at his command to foster the traits in a boy that go to form the right foundation for all that follows. Where but in school is there greater opportunity to foster a keen sight for facts? Where is there better opportunity than in mechanical drafting to build the habit of application and persistence in a course of activity? And who has greater opportunity than the *instructor* in mechanical drafting to foster a love for fine work, for high craftsmanship, the ideals that give a boy his direction? And such an instructor will insist on the right start by insisting on the finest set of drawing instruments each student can afford.

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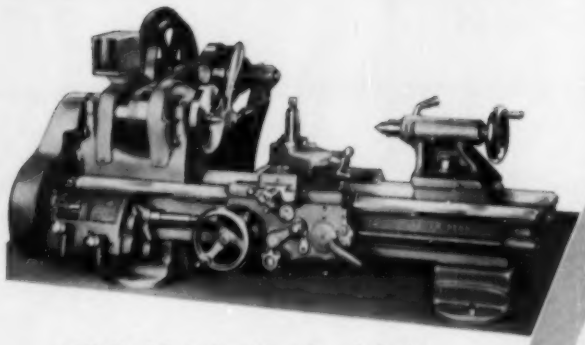
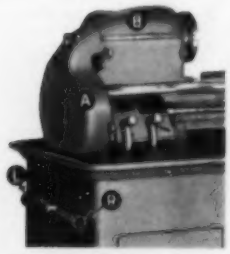


9" Model A Precision Bench Lathe
—12-speed drive, less electrical equipment, f.o.b. factory—$427. Other 9" Lathes from $235.

Light Ten Model A Precision Floor Lathe
—metal column base, underneath motor drive, less electrical equipment, f.o.b. factory—$821. Other Light Ten Lathes from $354.

SOUTH BEND LATHES



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SOUTH BEND 1906 50th ANNIVERSARY 1956

The simplicity of South Bend 9" and Light Ten Lathes have made them popular with both students and instructors. It opens the way to quick development of handling skill which means less work spoilage and student supervision.

Their practical design provides safety features that reduce the possibility of student injuries or equipment damage. These precision lathes, constructed for industrial production work, can withstand student usage with a minimum of maintenance.

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HOW-TO project for the School Shop

—by NICHOLSON FILE COMPANY

NO. 18 OF A SERIES

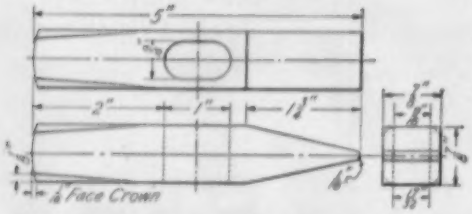
MAKING A TINNER'S HAMMER

This precision exercise affords the student excellent school-shop practice in efficient hand filing of both metal and wood.

Material: 1 piece 1" x 1" x 5 1/16" tool steel. 1 piece hickory, 1 7/16" x 1 1/16" x 14"

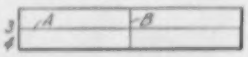
Tools: Layout dope, 6" rule and scriber, center punch, hammer, surface gage, square dividers, combination drill and countersink, 1/2" drill, chalk, copper vise jaws and the following Nicholson Files: 12" Flat Bastard, 10" Mill Bastard, 10" Round Bastard, 10" Square Bastard, 10" Cabinet Rasp Smooth, 10" Mill Smooth.

SCHEDULE FOR HAMMER HEAD



1. Square stock on the four sides to 7/8" x 7/8", using 12" Flat Bastard file. File ends of stock to 5" long with a 12" Flat Bastard file. Check with square.

2. Paint all sides with layout dope.



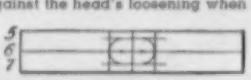
3. Set surface gage to 7/16" and scribe center line A the length of work on all four sides.

4. Measure off 2 1/2" from end of stock and scribe perpendicular center line B using square and scriber.

5. On line A lay off 1/2" on both sides of line B. Scribe lines parallel to line B on all four sides, using square and scriber.

6. Set surface gage to 5/32" and scribe a line from each side of work parallel to line A. Set surface gage to 11/64" and repeat procedure on back of work. This small taper in the eye will allow the handle to be wedged and keyed and will ensure against the head's loosening when used.

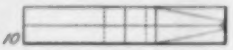
7. Lay off 7/32" on each side of line B on line A and make center punch mark. Set dividers to 9/32" and with one leg of dividers in center punch mark, scribe each arc to meet parallel lines. Repeat procedure on underside of head.



8. Hold work in drill vise to drill eye. Spot center punch marks with combination drill and countersink to 1/8" dia. and drill two 1/2" holes through work.

9. File taper on sides of eye to line with a 10" Square Bastard file. File radii with a taper using a 10" Round Bastard file.

10. To form the peen end of the hammer, scribe a line 3/8" from line B on four sides of work, using a square and scriber. On end of center line A, mark off 1/16" above and 1/16" below. Scribe lines to form wedge on both sides of work.



11. File wedge to line with a 10" Flat Bastard file, taking not more than 40 long, even strokes per minute. Guide the file to take a lead of half its width on each stroke. Round edge of cross peen with a 10" Mill Bastard file.

12. Lay out tapered bevels on the corner of the head end, using 6" rule and scriber. File taper flats with a 10" Mill Bastard file by holding the work across the corners in vise with copper vise jaws. Check the angles with the 45° angle, using a combination square.

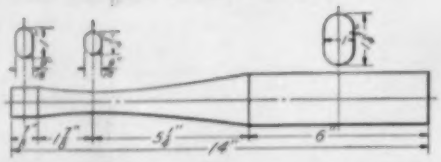
13. To form crown, mark off 1/16" on four sides of work with square and scriber. File to line with a 10" Mill Bastard file by rolling file across the end of work.

14. Draw file all over with a 10" Mill Smooth file, using chalk on the file to ensure a smooth finish. Have checked with an instructor.

15. Heat the head to the required temperature for the specifications for the steel used, quench it, soften the eye section, and draw the temper in the hammer striking surfaces under the instructor's supervision.

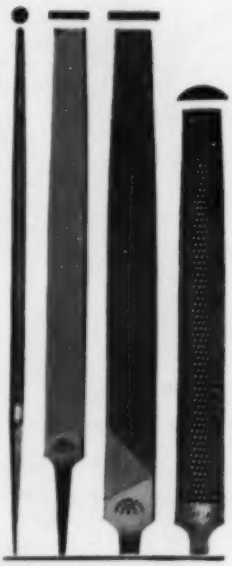
16. The hardened head may be polished, using emery cloth, if desired.

SCHEDULE FOR HAMMER HANDLE



17. To shape the handle, use a 10" Cabinet Rasp Smooth, blending all radii to dimensions given in drawing. If preferred, paper templates may be used to form curvature of handle.

18. Shellac the handle. Care should be taken to have a force fit on the hammer. If a wedge is desired, press the wedge in by arbor press, as hammering the wedge will loosen the press fit on your handle.



The Nicholson Round, Mill Bastard, Flat Bastard and Cabinet Rasp files (left to right) are shown reduced in sizes from those specified in text.

FREE REPRINTS OF THIS PAGE

for school-shop use will be sent to school heads or instructors on individual request. Ask for "How-to Project No. 18" and state minimum number of copies you need. NOTE: The files recommended in this project are obtainable at industrial supply houses and better hardware stores.

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MAY
1956

VOL. 45 NO. 5

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

Published on the 15th of the month preceding the date of issue by THE BRUCE PUBLISHING CO., 400 North Broadway Milwaukee 1, Wis. • CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 225 Broadway, New York 7, N. Y.

★ ★ ★

This Month's Cover

The cover picture of this issue was submitted by Harry A. Goldstein, A.P.S.A., instructor of photography in the Graphic Arts Department, Tucson High School, Tucson, Ariz.

The picture shows Gilbert Guerra, a welding student at Tucson High School. His teacher is George Hunt.

Photography by advanced photography student Larry Fetterly.

Summer School

Have you made plans to attend summer school this year? As usual, many fine teacher education institutions are offering summer school programs. Do not delay too long before making application to attend.

★ ★ ★

Entered January 7, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1956, by The Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, November 25, 1930. Published monthly except during July and August.

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Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for upon publication. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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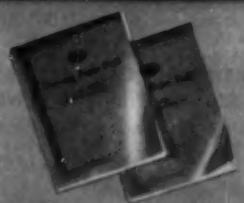
- ***Special school ordering service***—You can depend on Post when last minute demands make quick ordering necessary. The Educational Division is prepared at all times to give your order fast attention.
- ***Technical information***—Specifications and technical data are always available to instructors. Address all inquiries to Educational Division.

Post is always interested in the instructor's viewpoint

At association conventions and through regular field contact, Post representatives keep in touch with instructors throughout the country. From discussions of current school problems, our men carry away ideas that are often translated into new or improved products. A recent example—Post's introduction of the Rotolite Printer*, the first low-cost continuous printing unit. This economical unit enables instructors to demonstrate the actual printing process—a further step in preparing students for their future careers.*

**The Rotolite Printer is currently featured in Post's exhibitions at association conventions, as shown at right.*

POST PAPERS



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Association News

COMING CONVENTIONS

Apr. 20–21. Connecticut Industrial Arts Association, at Teachers College of Connecticut, New Britain, Conn. Secretary, Carl H. Hubachek, High School, Branford, Conn.

Apr. 21. Utah Industrial Arts Association, at Wasatch School, Provo, Utah. Secretary, Jay L. Nielson, Farrer Junior High School, Provo, Utah.

Apr. 21. Colorado Industrial Arts Association, at Pueblo Junior College, Pueblo, Colorado. Secretary, Harold Baldwin, 2618 Dahlia Lane, Pueblo, Colo.

Apr. 24–27. American Industrial Arts Association, at Hotel Schroeder, Milwaukee, Wis. Secretary, Dr. Kenneth W. Brown, Box 2350, Buffalo 23, N. Y. Local chairman, Roy A. Radtke, 1111 North 10 St., Milwaukee, Wis.

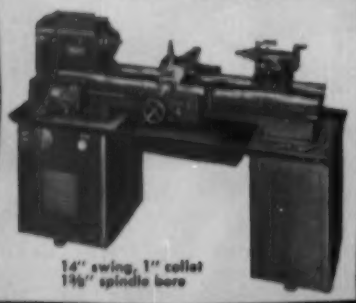
May 4–5. Wisconsin Association for Vocational and Adult Education, at Loraine Hotel, Madison, Wis. Secretary, C. D. Rejahl, 211 N. Carroll St., Madison, Wis.

May 12. Virginia Council of Industrial Education Clubs, at Hotel Roanoke, Roanoke, Va. Secretary, O. F. Haynes, High School, Petersburg, Va.

June 11–15. Colorado Vocational Association, at Colorado A. & M. College, Fort Collins, Colo. Secretary, Wynona Swepston, Fountain High School, Fountain, Colo.

June 23. National Council of Technical Schools, at President Hotel, Kansas City, Mo. Secretary, H. E. McCallick, University of Houston, Houston, Tex.

Logan
LATHES GIVE THE STUDENT INDUSTRIAL TOOL EXPERIENCE



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1⅛" bore

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WILLIAM W. McKNIGHT MADE HONORARY MEMBER OF IOTA LAMBDA SIGMA

First honorary member of Rho Chapter of Iota Lambda Sigma at Illinois State Normal University, William W. McKnight of Normal was initiated in ceremonies recently. Presenting the Iota Lambda Sigma Key to him is Cecil Oglesby, ISNU student president of the group. Looking on is Dr. R. M. Stombaugh, head of the industrial arts department at ISNU.

William W. McKnight receives honor

Mr. McKnight was chosen for this honor because of his outstanding contributions to the field of industrial education and especially for his interest in the industrial-arts program at Illinois State Normal University.

Mr. McKnight is secretary-treasurer of the McKnight and McKnight Publishing Company, publishers of industrial education texts. A graduate of Northwestern University, Mr. McKnight was named president of the Bloomington Association of Commerce in 1953. He is a director of Illinois Manufacturing Association as well as of the First National Bank of Normal and the Bloomington Federal Savings and Loan Company. A former ISNU student, Mr. McKnight also served as president of the ISNU Alumni Association for several years.

NORTH CAROLINA EDUCATION ASSOCIATION MEETING

Industrial arts teachers and guests of the Northwest District, N.C.E.A., met recently at the Lexington High School, Lexington, N. C., for a district meeting.

Tom Shores, local industrial-arts teacher and president of the district group, introduced L. E. Andrews, Superintendent of Lexington City Schools, who delivered a short address of welcome. A brief business meeting was held to make plans for a fall meeting.

A. B. Racster, distributive education, Greensboro, N. C., gave a demonstration of metal spinning. C. R. Edwards, Winston-Salem, industrial-arts teacher, gave a demonstration of leather tooling and carving.

The following members were present: W. S. Scarborough, G. O. Mann, R. W. Wechter,

(Continued on page 8A)

STANLEY SHOP TALK

CATALOG No. 34

This STANLEY TOOL CATALOG with the special school index is a particularly useful book of reference and tool information for the shop teacher.

Packed with descriptive facts and hundreds of illustrations, it makes tool selection sure and easy. The handy school index recommends items found most useful and serviceable for school use. It is based upon Stanley's long experience and the advice of educators.

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NAIL HAMMER

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No. 52½	10 oz.	No. 51A	20 oz.
No. 51½	16 oz.		
No. 51	20 oz.		

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The "Yankee" No. 993— Use on work bench, drill press or other machines, 2¾" jaws open to 3½". Other models in 1½", 2" and 4" jaw sizes. All have grooved "V" block for holding rounds, etc. Swivel bases for all "Yankee" Vises are available.

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ELECTRIC DRILLS

The Stanley No. 24A. A regular duty ¼" drill ideal in size and weight for instruction use. Power packed yet light in weight. 1100 r.p.m. full load speed.

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SUBJECT YOU TEACH or POSITION_____

SCHOOL ADDRESS_____

CITY_____ ZONE_____ STATE_____

ASSOCIATION NEWS

(Continued from page 6A)

C. E. Sauls, A. P. Racster, B. Ruiz, Greensboro, N. C.; B. L. Price, Mocksville, N. C.; C. R. Edwards, G. D. Sexton, R. R. Crookshank, Winston-Salem; C. E. Cashatt, Spray, N. C.; T. C. Shore, Lexington, N. C.; E. C. Anderson, C. R. Exum, Reidsville, N. C.; F. L. Halverson, Siler City, N. C.

Two of the teachers brought students with them to view the demonstrations. — *R. W. Wechter, Secretary.*

COLLEGE CREDIT FOR ATTENDANCE

Arrangements have been completed for the granting of one semester hour of college credit to all eligible teachers attending the 31st annual conference on printing education of the International Graphic Arts Education Association, to be held July 29 to August 3, 1956, at Santa Barbara College, University of California, Santa Barbara, Calif. This college credit may be used for meeting teachers' annual increment requirements, upgrading, and other college credential requirements.

Arrangements have also been concluded for the housing and feeding of attending members in the newly built dormitory on the campus at special low prices, and for use of Santa Barbara's campus bathing beach on the Pacific Ocean.

SEVENTEEN-YEAR-OLD BOY WINS SCHOLARSHIP

At the California Industrial Education Association, Southern Section convention in Ventura on January 21, 1956, the first annual Southern Section Scholarship was awarded to a twelfth grade boy who plans to become an industrial-arts teacher. This scholarship award of $200 is made available to the recipient upon verification of his enrollment in any California college where industrial-arts teacher education is provided.

The money for the award is obtained through a $10 donation given by each commercial exhibitor at the annual Southern Section convention.

Each of the nine local organizations within the Southern Section may screen candidates for the award within their district and then submit one name to the scholarship committee who interviews these candidates and reviews their high school records as contained in the applications. One winner is then selected from the entire Southern Section.

This year's winner is George Tilley, a B-12 student of Ted Elmgren at Westchester High School in Los Angeles. His record indicates outstanding scholarship and leadership both in school and in his community. George has a definite sense of direction and purpose in his life. When he was presented with his certificate and the beautiful trophy which will remain at Westchester High School for one year, he had this very well received acceptance statement to make:

"First I would like to thank the men of this committee who selected me for this honor. Also, I want to express my gratitude to those of you who made this scholarship possible through your generosity and foresight.

"By providing this 'inspiration for aspiration' as I call it, you are helping more than the recipient; you are helping the general public by putting more teachers in the field. That is very important.

"Many people have asked me why I ever considered teaching and they tell me the wages just aren't worth the effort. I have but one answer for them. I know that I will never get rich monetarily, but that doesn't matter to me. What matters to me is that I will be helping people through life and in doing so will gain a richness inside that will far surpass any monetary gains I might make.

"Once again, thank you very much."

George was presented again at the state C.I.E.A. convention in Bakersfield, March 16 and 17, 1956, in order that this boy and the scholarship program which he represents might gain recognition in a broader sphere of educational circles.

♦ The Epsilon Pi Tau 27th Annual International Fellowship Banquet and Leadership Symposium Program will be held at the Wisconsin Club of Milwaukee, Wis., on Tuesday, April 24, at 5:00 p.m.

During the months of April and May five new Epsilon Pi Tau Chapters are to be Installed.

Eta Field Chapter was installed at Tampa on April 6, with Bob Holmes, and President E. C. Nance of the University of Tampa as adviser.

Theta Field Chapter for the Commonwealth of Puerto Rico was installed on April 7 with Ferdinand Rossy, Antonio Figueroa, Jose Martina, *et al.*

Alpha-Omega, Campus Chapter at the University of Miami in Coral Gables, was installed on April 14, with George Mehallis, John McElheny, *et al.*

Beta-Beta Campus Chapter at San Francisco State College, will be installed May 19, with Dwight Nichols and the aid of Rho and Gamma Field Chapters.

Beta-Alpha Campus Chapter at San Diego State College with Ken Phillips, and the aid of Alpha-Beta, Alpha-Phi, Alpha-Psi, and Alpha and Beta Field Chapters.

(Continued on page 22A)

MAN SIZE or BOY SIZE

The Job Calls for

STARRETT TOOLS

By working now, in the formative year, with genuine Starrett Tools, your boys will acquire a wholesome respect for precision methods and the tools that make them possible.

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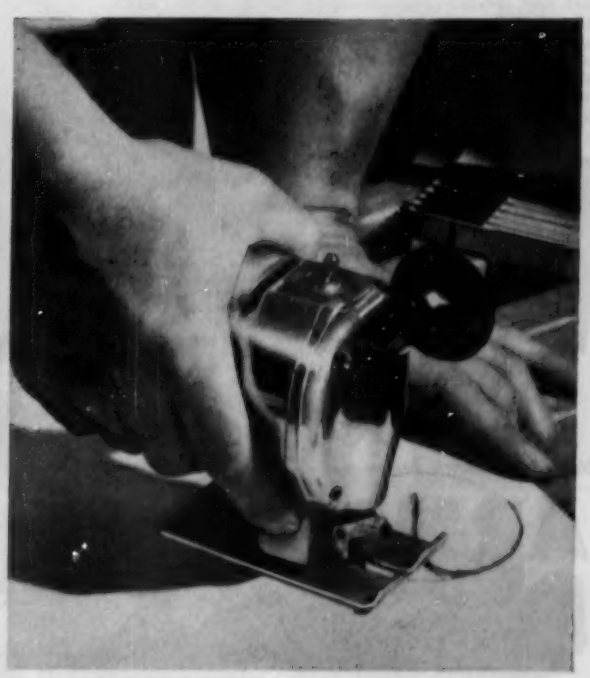
Black & Decker® Jig Saws

are faster, more accurate, easy to operate...and they're

POWER-BUILT TO LAST!



New Heavy-Duty Model races through 2x4's, metal, with power to spare!

NEW U-11 HEAVY-DUTY JIG SAW! Especially designed for heavy-duty installation, woodworking, plant maintenance jobs. Cuts to 45° angle . . . either side. Runs cool, even in 2x4 stock. Cuts practically any building material with correct blade. Full 1" stroke. Armature and gear shafts mounted on ball bearings. Minimum vibration, *extra* smooth performance. Heavy-duty shoe will not distort or wobble under pressure. Full line of wood and metal cutting blades available.

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Teach with tools THEY'LL USE on the job

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12" Lathe

18" x 6" Surfacer

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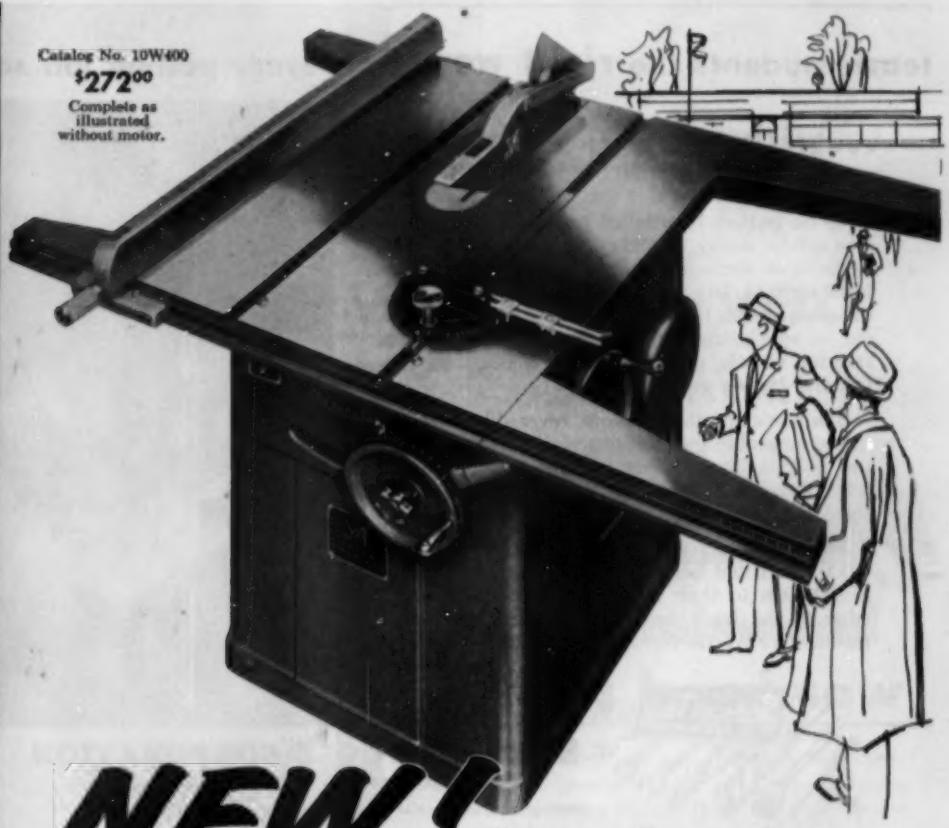
$272.00
Complete as illustrated without motor.



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From base to blade, a much better saw — for less money!

MORE CAPACITY! Does the work of a 12" saw — lets students choose a broader range of projects. Rips 3⅛" stock with blade at 90°. Saws to center of a 50⅛" panel. Has as much as 25⅝" of table in front of blade, with miter gauge extended.

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MORE FOR YOUR MONEY—ALL AROUND! Miter gauge that can't drop off table . . . exclusive feather-touch rip fence . . . accurately ground table surface . . . convenient controls positioned for safety.

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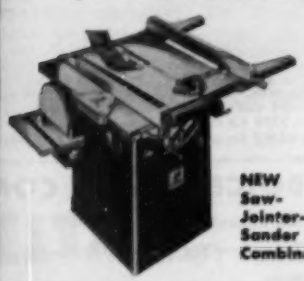

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Costs less, takes less space, than three individual machines of equal capacity.

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PTE-5

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COLUMBIAN MALLEABLE IRON CASTINGS ARE GUARANTEED UNBREAKABLE

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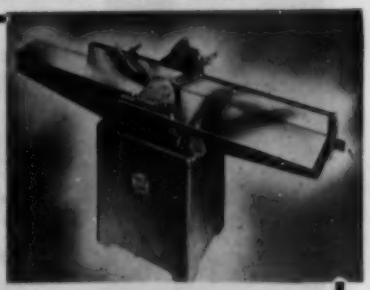

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Entire infeed table is a rabbet arm, adequately supporting narrow rabbeting on wide stock. When rabbeting, the guard stays on the machine — simply turns and swings out of the way. • Quick, positive, micrometer-accurate knife setting. A perfect finish, without chattermarks. • 3¼-inch dia. head. Improved cutting angle. Depth of cut, ⅝". Cutting arc dia. 3⅝". Speeds up to 5500 r.p.m.

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Students advance quickly on Parks Planers because they find them easy to operate, safe, and accurate. And, since both the Parks 12" and Parks 20" Planers have been designed and precision-built for accuracy and high-speed line production in industry, they are ideally suited for the school shop because they give practical experience on the type of machines your students will eventually use. Both machines are priced low enough for even the most modest shop budget.

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12" x 4" PLANER

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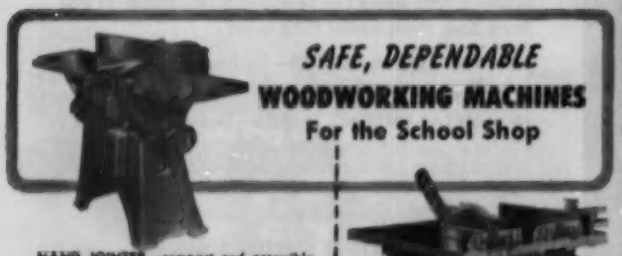

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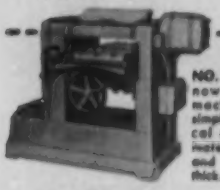
For the School Shop

HAND JOINTER—compact and accessible. Built in 8" and 12" width. Table 6'2" long, maximum rabbet depth 9/16". Round, 3 knife safety type cylinder head, 3 HP 3600 RPM motor.



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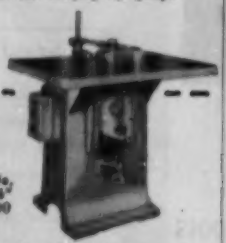
NO. 4 VARIETY SAW—for variety sawing in any shop! Standard table 44" long and 36" wide, plus 19½" extension for carrying rip gauge inside.



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16" FLAT STOCK.
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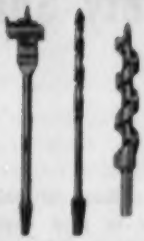

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Fast, easy-boring expansive bits with positive chip clearance. Two styles: Setfast with quick adjusting-locking feature, and Plain type. Wood-boring brace drills and solid-center electric-drill bits in various sizes.

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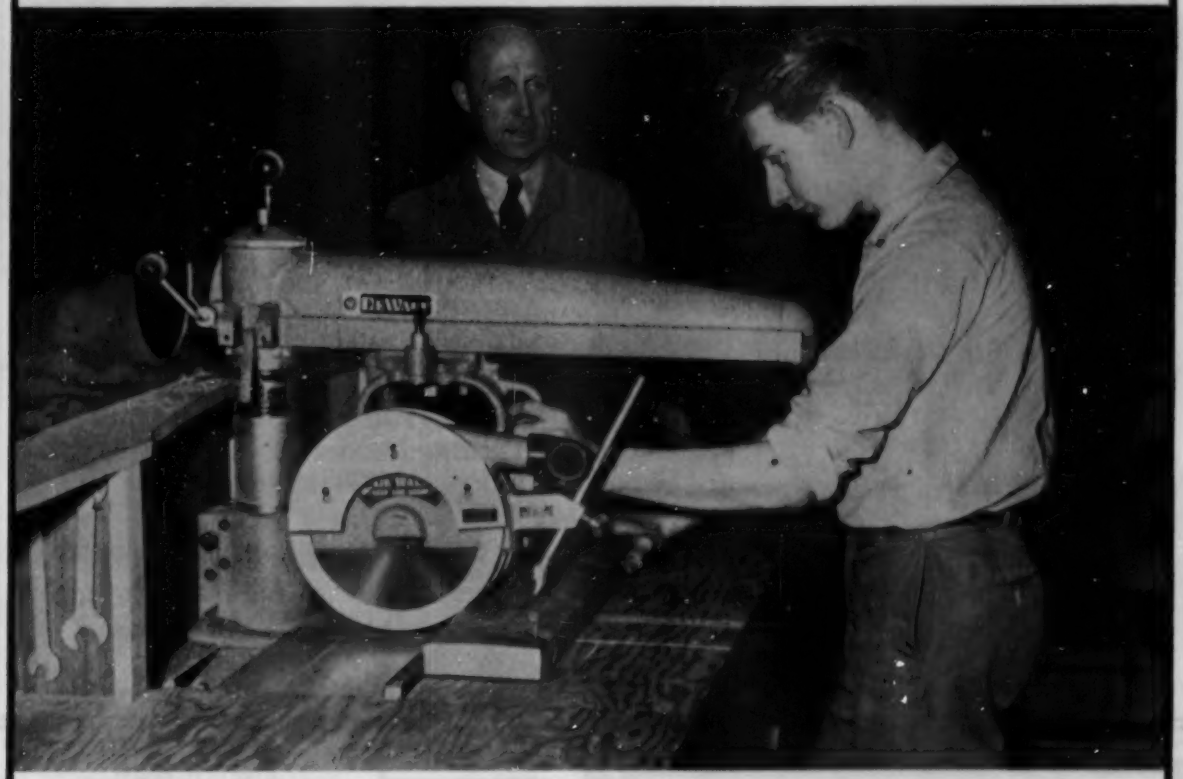

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You need these exclusive operating safety features: **A**—Simpler, safer top-side cutting with exclusive safety guard. See your mark *and* your saw. **B**—Power brake stops saw in 4 seconds for *added* safety. **C**—Safety key switch prevents unauthorized use. **D**—De Walt becomes tilting arbor shaper with exclusive shaper guard—gives 50% more shapes per cutter. Combines 12 basic power tools. Builds into workbench, gives safer straight-line handling.

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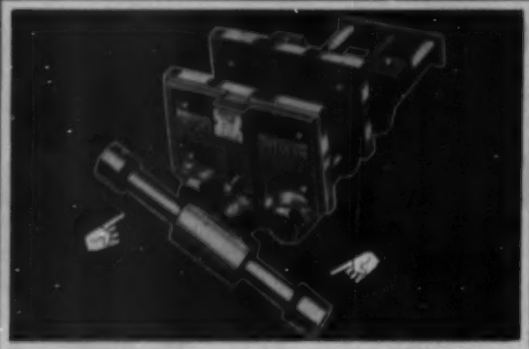

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The light, solid aluminum handles used on Wilton Woodworkers' Vises end finger injuries and reduce noise in woodworking shops. They have tamperproof end pieces, too! An exclusive Wilton feature, these aluminum handles **cost no more than wood or steel,** and are only one of many extra values found in all 16 models of continuous and rapid acting Wilton Woodworkers' Vises.

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TOOL MFG. CO., INC.
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ECONOMICAL!

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Queen City's new ¾ H.P. Bench or Pedestal combination Grinder and Buffer fits all school shop requirements perfectly. Find out why Queen City Grinders have been used in vocational training for over 30 years. Available from ½ H.P. on up.

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That's why tomorrow's shopmen must know how to use this modern painting system to increase productive efficiency

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
MAY 1956

A Good Question — Is

Automation — A Blessing or a Menace

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From the time of the Pharaohs to the middle of the eighteenth century there were few inventions. All manufacturing was done by hand and the craftsman was held in high esteem. While the ancient Greeks discovered the expansion of steam, it was not until 1760 that the inventive genius of the English asserted itself by the harnessing of steam. Thus was born the steam engine which resulted in the initial industrial revolution. With the advent of power-driven machinery the skilled craftsmen and apprentices received a severe occupational setback, as women and children were brought into factory employment, replacing the skilled workers. In addition thousands of rural inhabitants were uprooted from their homes and brought into expanding industrial centers. Orphanages were emptied to supply juvenile workers for the mechanized industries. The result was one of social, economic, and moral chaos.

The Industrial Revolution of the eighteenth century, which began in England, gave rise to the modern factory system and capitalism. The proponents of the system saw not only a means of greater employment and personal profit but a method of extending trade and commerce and thereby increasing the national economy. The opponents, particularly the skilled workers, saw their livelihoods ruined and their skills, acquired through long years of experience, grow obsolete. Naturally, the latter group was resentful, as they saw the factory owners grow wealthy and powerful while they became less useful as workers or saw their means of earning a livelihood vanish. Ever since, this struggle between the worker and the employer has continued. Serious labor disturbances seem to run in cycles. Today, however, we again find the workingman's fear of losing his job arising due to the increased mechanization of industry, particularly the new industrial processes called *Automation*.

Terms

Within a few years terms have come into being which are unfamiliar to most workers and lay people and to date have not even found their way into dictionaries. Among these are:

1. *Automation*

The production, regulation, and supervision of industrial products and processes by means of automatic, chemical, electrical, hydraulic, pneumatic, and mechanical devices.

2. *Controller*

A device for receiving information, usually in code, to operate automatic mechanism. It eliminates thinking on the part of the worker.

3. *Cybernetics*

The science underlying automation. It is a Greek word meaning *governor* and indicates a regulating device similar to a governor which regulates the speed of a steam engine.

4. *Feedback*

A self-correcting device to eliminate errors.

5. *Information*

Directions given "to the controller on the servomechanism which replaces a human being in the operation of a machine in a factory." It refers to such items as the rejection of all parts failing to meet "certain tolerances" or "specified dimensions."

6. *Punched Card*

A card with punched holes representing a code which opens and closes electrical circuits to perform certain operations, such as, operating a lathe to follow dimensions of a blueprint or layout.

7. *Robot*

A word of Czech origin meaning slave. A mechanical device that acts like a human being and replaces the operator.

8. *Tape*

A strip of paper or plastic magnetized for recording instructions which are fed into machines.

9. *Servomechanisms*

The mechanism that follows the instructions of the controller. The latter eliminates human brain power while the servomechanism replaces muscular power.

Technological Trends Which Induce Fear

The first Industrial Revolution had tragic social results. Organized labor leaders see a parallel with the introduction of automation unless some serious thought is given to it and safeguards are introduced to avoid serious unemployment problems. Fear is induced by reports such as:

1. A modern foundry has recently been put into operation in which castings are produced in large quantities but the molding sand is never touched by human hands.

2. An automatic engine plant produces twice as many engines as an old style plant with one tenth the man power.

3. A radio assembly plant introduces automated equipment which assembles 1000 radios per day with only two workers while 200 were formerly required.

4. An oil refinery which ordinarily would require 800 employees can be operated under automation with 12 employees.

5. A "general-purpose computer" is capable of doing the work of 200 clerical and personnel workers.

6. An auto plant which formerly required 36 men to feed parts into a conveyor for spray painting now requires only one worker and "varied colored finishes are applied automatically."

Industrial changes such as these cause labor leaders (1) to visualize the elimination of hard, back breaking labor of former years, the cessation of routine, dull, and uninteresting repetitive jobs; (2) the dislocation of workers' present jobs: (3) improved living and social conditions, if profits are equitably distributed; (4) the need for expanded markets; and (5) the necessity for solving the problems produced by automation, as the future success of our democratic system of society and capitalism is based upon a successful solution. Failure would endanger our way of life and give encouragement to the enemies of democracy and all those who oppose the American system of self-government and capitalism.

The Viewpoint of Management

The research departments of management are aware of the fears and mistrust that automation has and will arouse among workers. Scientific advancement and its application to industry can be stifled for only a short space of time, hence it is not wise for workers to attempt to stop technological progress. Industry takes the position that:

"In every case over the years, the advent of an improved method has meant increased employment, rather than fewer jobs. A true advance in the public well-being comes from increased production per worker, not from the preservation of outmoded techniques that keeps production per worker at a low level."

Good examples of this viewpoint are the automobile industry, the radio, television, electric refrigeration, and many other industrial products. All of which have produced price reductions and brought these articles within the buying power of millions of families.

Labor itself shares this viewpoint, which was appropriately expressed by the late Philip Murray in 1951, when he remarked:

"I do not know of a single, solitary instance when a great technological gain has taken place in the United States of America that it has actually thrown people out of work. I do not know of it, I am not aware of it, because the industrial revolution that has taken place in the United States in the past 25 years has brought into the employment field an additional twenty million people."

Current Employment Trends and Probable Effects of Automation

The trends in the new American technology, sometimes referred to as the Second Industrial Revolution, have been listed as:

1. The rapid growth in manufacturing. From ten million in 1939 to 17 million in 1953. This is an increase of 70 per cent, while the population increased only 22 per cent.

2. The growth in service industries and occupations, i.e., entertainment, sports, hobbies, leisure time activities, etc. This is the result of higher incomes, full employment, and more leisure.

3. The decline of employment in agriculture and mining. This situation is due largely to technological advances, greater production per man, more refined technical methods and greater industrialization.

4. The elimination of much of the drudgery in industry. Lifting, carrying, and moving articles once consumed much man power. Today these tasks are done by conveyors, lifts, hoists, and other mechanical devices.

5. The increased demand for technical and manipulative skills and related technical knowledge. This means more education — general and specialized — the need for more intelligence and less brawn.

Furthermore, management sees the new technology, as having problems arise which will affect:

1. Industrial relations and collective bargaining.

2. Improved working conditions including better safety methods and better housekeeping.

3. Revision of incentive payment plans, job classifications, and wage rates.

4. Greater responsibility on the part

Conference of the Automotive Service Schools held at Wayne University, Detroit, Mich.

Those who attended were (left to right): L. A. Mitchell of General Motors Corporation, Willard Bonson of Wayne University (on leave from Southern Illinois University), Irvin B. Thomas of the DeVilbiss Company, E. R. McAtee of the Barrett Equipment Company, P. S. Stead of Electric Auto-Lite Company, R. H. Seckinold of General Motors Institute, James Datseth of the Michigan Department of Public Instruction, Roy Dean of Carter Carburetor Corporation, and Stanley S. Bee of the Automobile Manufacturers Association.

Seated (left to right) are Richard D. Stevenson, Jr., of Ammco Tools, Ralph Bohn of Wayne University, H. M. Artley of Allen Electric and Equipment Company, L. A. Vaughn of Clayton Manufacturing Company, Ron Jonson of Bear Manufacturing Company, G. Harold Silvius of Wayne University, H. L. Helton of Wayne University, Paul Graves, executive secretary of the Detroit Auto Dealers Association, A. D. Althouse of the Detroit Public Schools, Frank Plavick of Delco-Remy, H. J. Van Westrienen of the Michigan Department of Public Instruction, Boyce Tope, executive assistant, Detroit Auto Dealers Association, D. E. Sherman of Wayne University, M. L. Gilbert of General Motors Institute, W. W. Squier of the Sun Electric Corporation, and Jack Harris (partially shown) of the Michigan Department of Public Instruction.

Information submitted by G. Harold Silvius, chairman and professor of the Department of Industrial Education, Wayne University, Detroit, Mich.

— Photograph, courtesy of Wayne University.

of labor and management and better co-operation.

5. The training and retraining of workers for more complex skills and the need for the building and maintenance of more complicated machines.

Conclusions

Automation is the result of a dynamic and forward looking people who believe in a democratic system of society based on the capitalistic system of growth and development. A system which affords the individual an opportunity to choose his occupation and progress within it, to the best of his ability and capacity. Automation, therefore, is *evolutionary rather than revolutionary*. While many workers fear displacement and loss or change of jobs, at least one survey indicated that the majority believe "its evils considerably outweigh its benefits."

The basic fears aroused by automation among workers is not new. The advent of the Industrial Revolution two hundred years ago caused workers to wreck power driven machines, do bodily harm to inventors and in one instance the inventor of a power loom was taken to the nearest stream and drowned. The result of experience during the past two centuries has taught, at least, three important facts: (1) technological advances march on relentlessly: (2) the best interests of workers failed to be served by trying to stop progress; and (3) improved methods have resulted in more jobs, better wages, improved material standards of living and better educational facilities.

It is also predicted that our social patterns will be changed as fewer production workers will be required but more workers will be needed in nonprofit and public enterprise jobs. It is estimated that from one half to one third of the labor force must become skilled workers to cope successfully with automation.

At present less than one tenth of America's workers are classified as skilled workers. This, then, implies an added responsibility for labor, management, school, and local community. Better programs in the fields of practical arts and vocational education on its various levels are essential. The era of automation has arrived and is progressing rapidly in certain key industries. In addition to a reasonable amount of fear or apprehension induced by any sudden change in our economy, there seems to exist a considerable amount of confusion and misunderstanding which should be eradicated at the earliest moment possible. The situation is well summarized by the following statement:

"We are handicapped by an appalling lack of knowledge of the actual perspective impact of automation, without which we cannot proceed rationally to deal with it. No one knows the extent to which it has already established itself in industry or the pace at which it is likely to advance even within the next few years. The individual company knows only what it has already accomplished and what further innovations it has on the drawing boards and in its capital budget for the future. It knows little or nothing of what its competitors are planning to do, even what is planned in other industries."

Therefore, it would appear logical that the various industries, particularly the major ones who dominate our industrial and commercial economy; convene, pool their information, try to determine the impact upon our economy and plan wisely to avoid serious dislocations in employment and abuses in our technological advancement.

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A Needful Discussion —

Public Relations in Teacher Education Programs

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Public relations has grown in importance as our civilization has become more complex and the transmission of ideas has been expedited. It has become more and more imperative in its relationship to our schools that are serving the public. It is more than a narrow set of rules — it is a broad concept and is the entire body of relationships that go to make up our impressions of an individual, an organization, or an idea. In building good public relations, we must be aware of all the forces, drives, emotions, and conflicting or contradicting factors that are part of our social life and civilization.

Public relations must keep the student as its focus, against the essential background of society's needs. Its purposes will include the following: (*a*) to inform the public about the work of the school, (*b*) to establish confidence in the schools, (*c*) to rally support for proper maintenance of the education program, (*d*) to develop awareness of the importance of education in a democracy, (*e*) to improve the partnership concept by uniting parents and teachers in meeting the educational needs of youth, (*f*) to integrate the home, the school, and the community in improving educational opportunities for all, (*g*) to evaluate the offerings of the schools in meeting community needs, and (*h*) to correct misunderstandings as to the aims and objectives of the schools.[1]

It is, and must be, a continuous process if it is to be successful in its endeavors. All activities will be honest, intrinsic, continuous, positive, comprehensive, sensitive to the groups concerned and presented in simple terms. Public relations can be developed only if such guides are used in its development.

The teacher within the school is in one of the most vulnerable positions for promoting public relations. He is working with one of the most plastic items in the world — youth — and will have considerable influence on those with whom he comes in contact. This is especially true of the industrial education teacher who meets the student on a more informal basis than most of the academic teachers.

[1]American Association of School Administrators, 28th Yearbook, Public Relations for American Schools, 1950.

How to Make the Teacher Public Relations Minded

The most important tool of public relations is a good competent teacher who has as his primary objective doing a good job. Satisfied students are the best proponents for developing good public relations regarding our program. However, if this is accomplished we must have strong teachers with sympathetic feeling toward their teaching position. It is the responsibility of the teacher education institutions to prepare the industrial education teachers in this phase of their work. Too many teachers are trained to enter the teaching field with an inadequate concept regarding public relations and therefore do very little about it when on the job.

What should the teacher education institutions that are selecting and training industrial education teachers do about this problem?

1. The teacher education institutions should keep in close contact with the local junior colleges, high schools, and industry in an endeavor to recruit individuals who possess the characteristics desirable for teaching.

2. The junior colleges and high school should be made aware of the critical need for industrial-education teachers. Counselors should be informed regarding industrial-education programs so that they can adequately explain it to those whom they counsel.

3. The teacher education institutions should hold frequent conferences with shop teachers, industrial education supervisors, administrators, and training personnel from industry regarding program improvement to facilitate good teacher education.

4. Teacher educators should hold conferences and discuss various aspects pertaining to the education of industrial teachers. Teacher education should be a co-operative affair between the various schools with the main objective of educating well-qualified teachers.

5. There should be complete understanding and a harmonious relationship between the schools educating vocational trade and industrial teachers and industrial-arts teachers.

6. Students entering industrial teacher education programs should be counseled and assigned an adviser who should take an interest in the student's program. Students who do not possess those qualities necessary for a good teacher should be counseled out of the teacher education program at the earliest possible moment.

Things to Be Stressed by Teacher Educators

Teacher education programs should be evaluated as to whether or not they are adequate to prepare the type of teacher necessary to teach industrial education in today's system of education. There are many aspects of the program that should be incorporated if this is to be done. Some of these are:

1. All students should be taught the skills essential to producing a good craftsman. Enough work should be provided in the various areas to make the teacher competent in his field. Those areas in which he is the weakest should be stressed.

2. Teacher education institutions should stress professional growth and develop within each individual the proper attitude toward the teaching profession. Each teacher should adopt "A Creed for the Industrial Arts Teacher"* by Dr. Heber A. Sotzin and endeavor to live up to it.

3. The teacher education program should be broad in scope and develop a well-rounded program of general education. It is dangerous to develop too narrow an individual and this often happens in training industrial education teachers.

4. Professional courses should be expanded to include work in audio-visual methods, techniques of evaluation, counseling and guidance, curriculum development, philosophy of education and courses in child growth and development. Considerable emphasis should be placed on the teaching for individual differences.

5. The student should be taught the value of organization within a school shop and methods of maintaining a well-balanced program. Good housekeeping, color dynamics, well-constructed and functional projects and local purchasing whenever possible tend to develop good public relations and sell the industrial education program.

Teachers of industrial education should be informed by the industrial teacher education institution in the use of the many media that can be employed in the area of public relations. These should be brought to the attention of the future teacher during all phases of his education program and include the following:

1. Parent Teachers Association
2. News items for local newspapers
3. Open house at the school shop
4. Public exhibitions by the department
5. School exhibits in showcases and on bulletin boards
6. Entering awards contests
7. Sponsoring radio and television programs
8. Service organizations within the community
9. Field trips to industry
10. Talks to community groups
11. Sponsoring youth organizations
12. Utilizing advisory committees in program planning
13. Membership in fraternal organizations
14. Sponsor hobby clubs
15. Adult education programs within the shops
16. Membership in professional organizations
17. Displays of student's work
18. Working with recreational programs
19. Utilization of community resources
20. Well-designed and constructed student projects
21. Good housekeeping in the school shop
22. Parent visitation
23. Attend local, state, and national professional meetings
24. Professional writing within the field of industrial education
25. Placement and follow-up for students

The student should be made conscious of public relations from the time he enters a teacher education program until he has completed it. During his methods courses he should be informed as to how to utilize the above media when he enters the teaching field. These are all valuable tools in public relations and should be understood by all teachers whether in industrial education or in other areas.

*June, 1948, issue of this magazine, p. 253.

Of the 61,562 Army men completing their education in Europe this spring, 23,585 were studying below the high school graduate level, 33,158 were taking United States Armed Forces Institute correspondence and high school courses and approximately 4000 were enrolled in the University of Maryland's extension program. — *Wisconsin Military Information Section.*

"Ears" of Submarine USS Nautilus are provided by rubber panels that sound waves penetrate as they move through sea. Panels, developed by B. F. Goodrich, form part of sub's hull and house sonar gear for detection of surface and other undersea craft by reflected soundwaves. Installed fore and aft, "ears" share characteristics of ocean water, thereby preventing distortion of sonar signals. — *Industrial Research Newsletter.*

During World War II the port of Boston shipped nearly a half-million tons of military cargo each month to support our combat troops. — *Public Information Office.*

A Problem Solved —

Teaching Lettering to Left-Handed Students

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The secret of efficiently instructing any student in the lettering skills of engineering, architectural and freehand drawing is to provide that student with a thorough knowledge of basic lettering strokes. However, the left-handed student presents a special problem, but with diligent practice and some special assistance from his instructor, any *left hander* can make splendid progress in his lettering.

In the mastery of every trade or profession, the participant discovers certain basic or fundamental procedures that must first be learned and perfected. In lettering, there are six basic strokes which must be mastered, for they are applied to the greater percentage of alphabets. Figure 1 shows these strokes.

Most of the lettering that the student will encounter in his drafting or drawing class, will be of the single stroke, Gothic variety. Whether the student be right- or left-handed, he must perfect the six basic strokes if he is to become proficient in even single stroke, Gothic lettering.

As they study the alphabet and numerals, both left- and right-handed students can be shown that if the characters were to be broken up into different

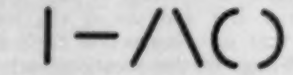

Fig. 1. The six basic strokes used in lettering

Fig. 2. How to hold the pen for lettering

categories or families by basic strokes, eleven families would result. Each of these families contains a specific combination of the six basic strokes.

The order of strokes in the families will be different for the left-hander than for the right-hander, since the right-handed student, in progressing away from his body, keeps his completed lettering in view and does not conceal any of the elements of the character. In contrast, the left-handed student progresses toward his body; therefore, he is constantly covering both his completed work and the elements of the character which he is forming, a technique which often results in inconsistency in lettering. See figure 2.

It is suggested that the left-handed student use vertical lettering rather than inclined because the slope of the inclined character runs completely off into space whereas, with vertical lettering, this problem does not arise.

The alphabet recommended for the naturally left-handed student, whose lettering position is just the reverse of that of the right-handed student, Figure 3, is in many cases the same as the alphabet recommended for the hook-wrisled left hander. In a few cases, a mixture of strokes will be found most suitable for meeting the individual's needs. The hook-wrisled left-handed student faces a considerable problem in that rather than using his pencil or pen in the conventional way, he pushes it in the reverse direction, inclining the pencil or pen until the point tends to dig into the paper. See Figure 4.

Each left-handed student should self-evaluate his own abilities so that he understands what combination of strokes fits him best. In using this method, the student breaks up each

Fig. 3. Position of the straight-wrisled left-handed student.

Fig. 4 (lower) . Position of the hook wrisled left-handed student

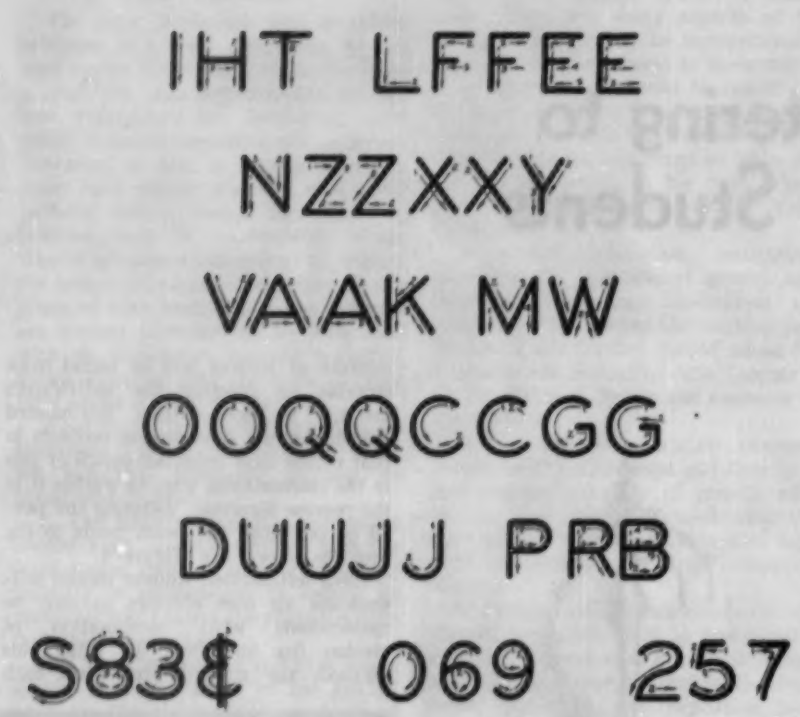

Fig. 5. Component parts of the alphabet

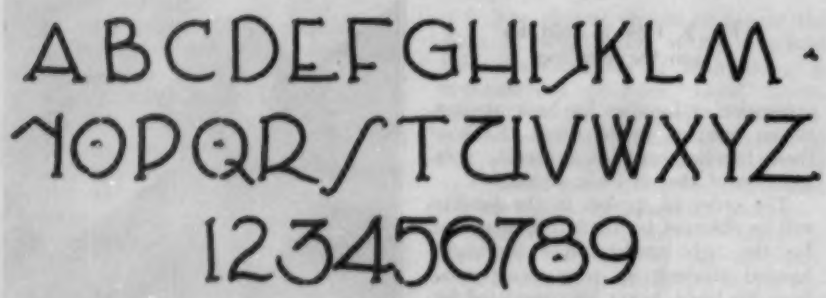

Fig. 6. Alphabet used by architects

character into its component parts and numbers each component part until the character is complete. See figure 5. If the student finds it desirable to use a different order by which to form a character, he should letter that character in the manner by which he obtains the best results.

As has been shown earlier in this article, single stroke, Gothic letters are well fitted for all phases of engineering drafting. But for architectural drafting and freehand drawing, an alphabet of more *snap* may be used for eye appeal and to enhance the plate or rendering. As inappropriate lettering may ruin the appearance of the finished drawing, an alphabet must be chosen with care, and it should be one that can be used for other phases of lettering.

The left-handed student will find that after mastering single stroke, Gothic style he will be able to progress into the architectural style of letter without too much trouble, especially if he carries with him the construction of characters that were used in the alphabets described in this article.

A popular alphabet that is being used by students for both architectural and freehand drafting is one which is a derivation of the Roman alphabet. Figure 6 is an alphabet that contains serifs, but eliminates heavy elements, thus converting the alphabet into a virtual single stroke alphabet.

A "NEW LOOK" AT PUBLIC RELATIONS

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There are a great many teachers of industrial arts who prefer to relegate their academic life to the functioning of their school shop. They spell this out in terms of maintenance of equipment, upkeep, and improvement of the physical plant and instruction of their students within the scope of the prescribed course of study.

Those who are devoted teachers unstintingly give of themselves to the task of helping their students develop skills, aptitudes, and understandings which will forever enrich their lives. For this they are to be commended. There is no doubt, that the students whom they so assist are deeply grateful and go into the community endowed with a sense of appreciation and warm regard for their instructor. There is no finer testimonial to the character, professional integrity, and community service of these men.

However, unfortunately, this is not enough. If the teachers of industrial arts are to retain their professional standing not only in the eyes of their fellow educators but under the withering glare of a critical, cost-conscious public we must do a more conspicuous job of demonstrating our professional competence.

In unmistakable language this means initiating a personal program of public relations that will vividly portray your integral role in the school curriculum.

"Bosh!" you say.

Then you rely too strongly on the elements of tenure, on your personal appeal or on the fact that the community has invested so heavily in equipping your splendid shop.

If so you think, then pay heed. For here lies a sobering tale. In one of the largest, most stable communities (school systems) on the east coast, industrial-arts teachers returning from summer vacations, advanced studies, or temporary work situations found themselves faced with newspaper headlines that had explosive overtones — for them. Aroused members of their school board at a prior to school-opening meeting had torn apart the offerings of high school industrial arts and voiced the sentiments that such instruction duplicated the offerings of the vocational schools and thus was unnecessary. Imagine the chagrin of the teachers involved and the fears that beset them. Most for-

tunately, a wide-awake school superintendent handled the situation with tact and intelligence and the matter was resolved. But not before many a shop teacher's home was beset by inner conflict and sleepless nights.

Those educators who are proponents of the well-worn adage that "it is a great deal better to sit in the back row and be discovered than to sit in the front row and be found out" are apparently deluding themselves.

You know who these people are. There are many ways in which they identify themselves. They express this belief by their disinterested behavior at faculty meetings, lackadaisical attendance at parent-teacher association functions, and lack of participation in extra-curricular faculty-student endeavors. Furthermore, they fail to maintain close relations — if any — with the trade associations that represent their particular field of activity. They do not realize the necessity for impressing all acquaintances with their professional offerings and with their personal attributes. Modesty or reticence will not further their influence nor will it bring them recognition, much less applause.

There is a further hazard in connection with *sitting in the back row* — it is so easy to lose interest and go to sleep. And far too many of us are permitting ourself this outrageous luxury.

Well, what is public relations? Public relations is all the things you do to make friends and create respect for yourself, for your profession, and for your school. No matter how you feel about public relations, make no mistake, it is always with you. Whether it be good, bad, or indifferent, is up to you. However keep in mind that what you do, reflects upon yourself and eventually on all of us.

Agricultural Education in the Philippines*

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The Philippines is primarily an agricultural country and because of this, one of the most important phases of the Philippine educational system is that which deals with agricultural education. Since the beginning of the century, the government has taken great interest in pushing through a program of agricultural education which will awaken the people to develop the agricultural resources of the country.

At first, the government was confronted by a great obstacle — that of the unpopularity of agricultural education among the people who considered it a disgrace to do manual labor. The government's program of agricultural education has slowly but steadily materialized, now producing men and women engaged in developing natural resources toward a goal of economic self-sufficiency.

*Lecture delivered before the Southeast Asian delegates of the International Labor Organization on April 7, 1953 at 8:00 a.m. in the College Auditorium, Central Luzon Agricultural College, Nueva Ecija, Philippines.

A Brief Historical Sketch

A national agricultural school was one of two schools, established in 1901 by Act No. 74 of the first Philippine Commission. Section 24 of this Act provided an appropriation of $15,000 for the establishment and maintenance of this school and a sum not to exceed $400,000 was appropriated for the construction of the needed buildings.

It was not until Executive Order No. 10 was issued by the Governor-General on April 10, 1907, that there was established the first national agricultural school, the Central Luzon Agricultural School. In the field of higher agricultural education, the College of Agriculture, University of the Philippines, began its class work in June, 1909.

The establishment of Central Luzon Agricultural School was followed in 1910 by the opening of farm schools which were later converted into regular provincial agricultural schools. These schools started as unpopular schools because at that time, people considered it a disgrace to do manual labor. The initial work of opening agricultural schools was difficult. Forests had to be cleared, roads and buildings had to be constructed with limited equipment. The facilities of instruction were inadequate.

In 1914, the Central Luzon Agricultural School, which started with intermediate classes, offered the first year of a secondary vocational agriculture curriculum. In 1916, it received more special support from the national government and as a result, it forged ahead as a model school for agricultural schools of the elementary and secondary level.

Great impetus to agricultural education came with the passage of Act 3377, commonly known as the Vocational Education Act of 1927. This measure, among other things, gives the controlling purpose of agricultural and rural schools which is "to fit the pupils for useful employment and to meet the needs of persons over 14 years of age who have entered upon and are preparing to enter upon the work of the farm home."

As a result of this vocational education act (Act 3377), the vocational education division of the bureau of public schools was created. The three original sections in this division were: the agricultural education section, the trade and industrial education section, and the home economics section. The creation of the vocational education division is significant because of the resulting greater and more efficient supervision for

President of the Philippines, Elpidio Quirino, was present at the installation of Arcadio G. Matela as first president of the Central Luzon Agricultural College, January 6, 1951

the benefit of vocational schools which include agricultural institutions. The head of the vocational education division is a chief and superintendent of vocational education. He is assisted by one assistant chief, superintendents, and supervisors under the different sections. Each section has its own chief and supervisors. Dr. Gilbert S. Perez, head of the vocational education division, is the man mainly responsible for the promotion of vocational education in the Philippines. He is often referred to as the Father of Vocational Education in the Philippines.

Supervision of agricultural instruction in the Philippines is the main function of the agricultural education section of the vocational education division of the bureau of public schools. The chief and superintendent of agricultural instruction heads this section. He had three supervisors; namely, supervisor of vocational agriculture, supervisor of elementary agriculture, and supervisor of farm and settlement farm schools. Until its conversion into a college, this institution was also under this section.

One other result of Act 3377 was the establishment of more agricultural and rural schools. Another result was the reevaluation made of subject offerings in academic high schools so that in 1932, some cultural subjects were made optional and vocational subjects required in their stead. Thus were born the general secondary schools which are now offering required vocational subjects including agriculture.

Meantime, the Central Luzon Agricultural School, the mother of agricultural schools, was becoming the pivotal center of agricultural education. In 1934–35, a one-year farm mechanics course was first offered in the Central Luzon Agricultural School to agricultural and rural school graduates. Later, this school also offered a two-year special course for academic high school graduates who desire to become scientific farmers. These graduates take up all the agricultural subjects. For fieldwork and shopwork, the students are rotated through different details to give them work experiences a farmer must have. This course gives a chance for academic school graduates to reshape their lives by taking agriculture.

Many legislative measures were passed before the war to encourage agricultural education in the Philippines. Commonwealth Act No. 300 converted the Iloilo and Cebu trade schools and the Baybay and Bukidnon agricultural schools into national schools. Commonwealth Act Nos. 313 and 446 augmented other appropriations to give greater opportunity for growth and development of these schools.

Taking the leading role after the war as a pivotal center of agricultural education, the Central Luzon Agricultural School offered short-term special courses to adults to help them rehabilitate their lives after the war. These special courses were sometimes offered in the dialect. This school also conducted researches and extension services. It embarked on an ambitious program of public relations to popularize agricultural education among the people. Its conversion into a college on December 31, 1950, was a recognition of its dynamic leadership. Since then, it has worked harder to deserve the government's and the people's patronage. More people see youth's potentialities redirected to agricultural fields. As a result, there has been a great demand for schools of the Central Luzon Agricultural School type.

The demands for more agricultural education in the Philippines' public school system have made our Congress pass more legislations benefiting agricultural education. In 1946, a national agricultural school in Negros Occidental was established by Republic Act No. 43. Republic Act No. 175 was passed to include national vocational schools as authorized to collect tuition fees. In 1948, a junior agricultural high school was established in Bunawan, Agusan by Republic Act No. 301. Republic Acts 303 and 326 appropriated sums for the rehabilitation of some agricultural schools.

Other legislative acts converted high schools into agricultural schools, or national rural schools, established new agricultural schools, and appropriated money for rehabilitating or maintaining such schools.

These series of legislative enactments clearly are indicative of the growing interest of the government in promoting vocational agricultural education. Many

Booth of the Central Luzon Agricultural College in the Philippines International Fair

government and private agencies have greatly co-operated in encouraging youth to take agricultural education by their demands for agricultural graduates. The Mutual Security Agency and the Philippine Council for United States Aid have embarked on a huge program of aid for agricultural schools.

The future is indeed bright through agricultural education.

Phases of Agricultural Education

Agricultural education is provided for in the Philippine educational system from food production in the primary grades and continuing through the university. In the primary grades, the pupils are introduced to the fundamental elements of agriculture and the rudiments of planting and cultivation. In the intermediate grades, Grades V and VI, elementary agriculture is offered. Intensive agricultural instruction is given in the settlement farm school, rural high school, agricultural high school, and college of agriculture. I shall discuss briefly the phase of agricultural education in the Bureau of Public Schools.

A. Elementary Agriculture

1. General Elementary Schools. In the primary grades in general elementary schools, formal agricultural education is not provided but food production activities are required.

In Grades V and VI of the general elementary school, elementary agriculture is prescribed and is allotted 60 minutes a day, 5 days a week. This course aims to equip pupils with basic knowledge, habits, skills, and attitudes related to agriculture. It provides experience and information to help students explore the prevocational nature of rural life and work.

The five branches taken up in elementary agriculture are: vegetable gardening, nursery work, fruit growing, landscape gardening and agricultural clubs. The allotted time to agricultural educa-

tion of 60 minutes is 28.7 per cent of the whole daily program.

The instruction is both theoretical and practical. Theoretical instruction is given in the classroom and the practical work is carried out in vegetable gardens and orchards. In Grade V, instruction is given in the preparation of garden soil, raising and transplanting of seedlings, care of plants, cultural methods, harvesting, use of vegetables, marketing, and nursery work. In Grade VI, the course includes Grade V activities, as well as simple plant propagation, fruit growing, and landscape gardening. Under farm work, the girls are required to take at least one of the following: light gardening, pig raising, poultry raising, or agricultural club work. Agricultural clubs supplement the work in the school because vegetable gardening has been required as one of the projects of the members.

2. Farm and Settlement Farm Schools. Basic vocational agricultural training is also given to elementary school pupils in farm and settlement farm schools. Farm schools are established for pupils in organized communities. Settlement farm schools are located in sparsely settled regions as the nuclei of permanent settlements.

In the primary grades, both types of schools, offer, in addition to agricultural subjects, regular farm work of 60 minutes a day to be given either early in the morning or late in the afternoon.

Besides the regular farm work, the pupils also take gardening, animal raising, club work, or ground improvement. Pupils, especially girls, who are not physically able to do strenuous work on the farms may be given lighter details. During inclement weather, the pupils may be given indoor activities, such as handicrafts, and repair or cleaning of farm and garden tools, in lieu of the regular work in the field.

In the intermediate grades, both types of schools include academic and field work in farming. Field work in both schools is given 80 minutes time in the daily program and includes gardening, farm crops, and club work. The period may be utilized in carpentry, repair work, and ironwork when it is necessary or when the weather does not permit outdoor work. Girls enrolled in these schools have practical work in home economics and at least one of the following: poultry raising, pig raising, light gardening, or agricultural club work.

B. Secondary Agricultural Education

1. Agricultural Course in General Secondary Schools. After a tryout in Batangas and Capiz in 1932, some subjects became optional and vocational courses were required in their stead in general secondary schools.

In the first year, every boy is required to take six of the eight exploratory courses, each course to last six weeks. The remaining days of the school year are devoted to vocational guidance to enable each student to know his attitudes and inclinations. The exploratory courses in agriculture in the first year are in horticulture, agronomy, and poultry and swine. The time allotment for each course is 80 minutes a day, 5 days a week, for six weeks.

In the second, third, and fourth years, the electives in vocational agriculture are horticulture, agronomy, and poultry and swine. Each elective is given 80 minutes a day, five days a week, throughout the school year.

2. Agricultural Schools. Secondary agricultural curriculum is offered in rural high schools, agricultural high schools proper, and in regional agricultural schools. Attached herewith as Enclosure No. 1 is the curriculum for agricultural schools on the secondary level. The students in these types of agricultural schools are provided with theoretical instruction in vocational agriculture, such as horticulture and agronomy including plant biology, animal husbandry including animal biology, general and applied chemistry, farm physics and farm engineering, and farm economics. The boys are required to render field work 4 hours daily, six days a week. The best setup to meet this requirement as practiced in the Central Luzon Agricultural College is to devote one-half day for academic subjects and one-half day for field work.

The cultural phase of the curriculum includes the study of English, general science, general mathematics, world history, Philippine history and government, current events, and Philippine national language. Health and physical education and preparatory military training are also required subjects.

Girls taking the secondary agricultural curriculum take all the subjects of the boys except premilitary training. Instead of the boys 4 hours field work, they study homemaking subjects and render two hours practical work.

A brief description of rural high schools, agricultural high schools and regional national schools offering the secondary agricultural curriculum follows:

1. *The Rural High Schools.* These schools are generally located in thickly populated agricultural regions where the site, equipment, housing accommodation for teachers and students, and other facilities are very limited. Most of these schools are supported locally by the province or municipality or both, which cannot give adequate funds. As a result, the co-operation of parents of students and other people is often requested to help the schools provide some fund for farm implements and tools, work animals, seeds, livestock, poultry, and other facilities for agricultural instruction.

2. *Agricultural High Schools.* They are generally located in regions where there are extensive sites and adequate facilities for vocational agricultural instruction, such as farm equipment and tools. They have also housing accommodations for students and teachers who are required to live inside the school reservation.

These schools are in session throughout the year. The curriculum requires forty weeks of regular farm activities and academic work. The aim of these schools is to produce graduates who are efficient in animal and crop production.

The agricultural high schools are mainly supported by the province. The national government contributes to their support in proportion to the number of their enrollment.

3. *Regional Agricultural Schools.* These schools own very extensive sites and are strategically located to serve a region. These schools are supported by appropriation from the national government and local receipts from fees and income. Two of such schools are the Central Luzon Agricultural School and the Bukidnon National Agricultural School until they were converted into colleges. At present, there are 6 regional agricultural schools, one in Luzon, four in the Visayan Islands, and one in Mindoro.

The Farm Mechanics Course

The Farm Mechanics Course as offered in the Central Luzon Agricultural College and lately at the Mountain National Agricultural School is primarily intended to acquaint agricultural graduates with the mechanized way of farming. Training is given in the operation, repair, and maintenance of agricultural machinery, such as tractors, rice mills, and other important machinery in use in agricultural schools. This course is offered only to graduates of the secondary agricultural curriculum.

The course includes such unit courses as building construction, general metal work which includes also blacksmithing and welding, repair of various kinds of farm machinery, the installation and maintenance of power engines, such as diesel engines and dynamos, and the proper maintenance of these machines.

Some of the graduates of this course find employment in many agricultural enterprises where farm machinery is used, while the rest are absorbed by the agricultural schools as teachers or as mechanics of the school to see the proper

care, repair, and maintenance of farm machinery.

Higher Education

The College of Agriculture of the University of the Philippines in Los Baños, Laguna, founded in 1907, has been organized to pursue resident instruction, research, extension service and subsidiary co-operative services.

Instruction is given in the following departments: (1) agricultural botany; (2) agricultural chemistry; (3) agricultural economics; (4) agricultural education; (5) agricultural engineering, including mathematics and physics; (6) agronomy, including horticulture; (7) animal husbandry, including poultry husbandry; (8) languages; (9) entomology; including zoology; (10) plant pathology, including agricultural bacteriology; (11) and soils.

A college offering higher education above the secondary level is the Central Luzon Agricultural College which started collegiate classes on July 9, 1951, and now offers, in addition to its present courses, subjects leading to the title of Associate in Agricultural Education and the degrees of bachelor of science in agricultural education and master of science in agricultural education.

The Bukidnon National Agricultural School, by virtue of Republic Act No. 807, approved June 21, 1952, has been converted into the Mindanao Agricultural College which will offer, in addition to its present courses, "also a two-year, a four-year, and a post graduate course leading to the title of Associate in Agriculture and/or Agricultural Education and the degrees of bachelor of science in agriculture, bachelor of science in home economics, bachelor of science in agricultural education, master of science (with majors in the different agricultural sciences), and master of agricultural education."

A college newly created by Republic Act No. 763, approved June 20, 1952, is the Mindanao Institute of Technology which "will offer not only elementary, secondary vocational and normal courses of instruction but also collegiate agricultural and industrial courses leading to bachelors' degrees." This College is not yet in operation.

This brief discussion on higher education would be incomplete without mentioning two institutions whose leadership in private agricultural education is worthy of emulation. These two institutions offering higher agricultural education are the Silliman University in Dumaguete City and the Araneta Institute of Agriculture in Malabon, Rizal.

The writer has discussed briefly the phases of agricultural education in the Philippines to give you an idea how the government is exerting all its efforts in pushing a total mobilization program of popularizing agricultural education among pupils in the primary grades and up through the university. Although the problem of financing agricultural schools has been tremendous due to the need of adequate facilities, equipment, and supplies, which cost much more than those needed in academic courses, the Philippine government has done its best to furnish the requirements of standard agricultural schools.

Rice planting in the Philippines

Here follows a chapter on training of teachers of agriculture because in this field, the Central Luzon Agricultural College is now blazing a way for making agriculture convincing to the youth of agricultural areas as the best profession for directing their potentialities for service as well as for economic stability.

Teacher Training in Agricultural Education

One of the deterring factors in the progress of agricultural education is the lack of professionally trained teachers of agriculture or the lack of teachers who possess the technical know-how in agriculture and who have had professional courses in educational methods and techniques. Most teachers of agriculture are graduates of the normal, academic, or agricultural high schools. Some teachers are agricultural college graduates but they have had no professional training in teaching.

As of August, 1952, there are 6478 schools of the elementary level offering agricultural subjects, with a total number of 24,882 teachers. Of this number, about 4500 are teachers of elementary agriculture, of which only about 10 per cent, or 450 teachers, are educationally and professionally qualified to teach the subject. On the secondary level, there is an initial need of 714 professionally trained teachers in general high schools and 195 teachers in agricultural schools. The need in private schools who are now offering agricultural subjects is almost the same. In the face of this alarming need for professionally trained teachers of agriculture, a program of teacher training in agricultural education is being worked out to solve the problem immediately.

The Certificate of Agricultural Education

Teachers of agricultural education in the secondary schools were originally prepared in the College of Agriculture, University of the Philippines, for which purpose it is given the sum of $25,000 annually from the operation of Act No. 3377, usually known as the Vocational Act of 1927. A certificate in agricultural education is granted to students of agriculture pursuing their major studies in the Department of Agricultural Education and taking minor specializations in one of the following: (1) agronomy or horticulture, (2) animal husbandry, and (3) agricultural engineering. Other students who are majoring or have majored in agronomy (farm crops or horticulture), animal husbandry, or agricultural engineering may prepare for teaching agriculture by pursuing the course leading to the Certificate of Agricultural Education. No student is granted the certificate unless the candidate is a holder of the bachelor of science in agriculture degree, or is to be conferred the degree concurrently. The schedule consists of additional 20 week-hours carrying 26 units of teacher training subjects.

Republic Act No. 415

The teachers trained in the University of the Philippines at Los Baños, Laguna, have been very few. To remedy further the alarming need of teachers of agriculture, Republic Act No. 415 was approved on June 18, 1949. This Act

created teacher-training departments in five national schools, three of which are national agricultural schools, for which the sum of $500,000 was appropriated for the operation and maintenance of the departments. Training departments for agricultural teachers for both the elementary and secondary schools were to be established in the Central Luzon Agricultural School, Baybay National Agricultural School, and the Bukidnon National Agricultural School. The last two schools started their training departments in the school year 1952–53, while the Central Luzon Agricultural School was converted into a college on December 31, 1950.

Professional Vocational Classes

A significant move taken by the Bureau of Public Schools to train teachers of agriculture was to offer six-week professional vacation classes to teachers of vocational agriculture and elementary agriculture in the former Central Luzon Agricultural School (now this College) from 1948 to 1951. Summer Institutes have been offered by the Central Luzon Agricultural College since then. The aim of these summer classes has been to train teachers of agriculture as well as to provide professional growth in agricultural education.

Central Luzon Agricultural College and Training Teachers of Agriculture

The greatest boon to the program of teacher training in agriculture came with the elevation of the Central Luzon Agricultural School into an agricultural teacher-training college, offering the title of Associate in Agricultural Education and the degrees of bachelor of science in agricultural education and master of science in agricultural education. The first year collegiate classes in training teachers of agriculture was opened on July 9, 1951. Enclosure No. 2 of this lecture is the curriculum in agricultural education offered in the Central Luzon Agricultural College.

Technical instruction is provided for in such subjects as fundamentals in animal husbandry, principles of crop production, general horticulture, poultry husbandry, swine husbandry, vegetable gardening, farm shop practice, agronomy, principles of agricultural economics, principles of soil science, economic entomology, plane surveying, livestock feeds and feeding, cattle and carabao husbandry, horse and goat husbandry, genetics, diseases of plants, farm management, and farm machinery and farm motors. Of these subjects, an associate in agricultural education student should take 32 units while a bachelor of science in agricultural education student should take 74 units.

The professional education courses given to students of this college are: introduction to education, educational psychology, principles of vocational education, principles of guidance, tests and measurements, administration and supervision of school and home gardening and agricultural clubs in elementary schools, administration and supervision of school and home projects in secondary schools, methods of teaching vocational agriculture, methods of teaching elementary agriculture, agricultural school administration and supervision, rural sociology and rural education, and observation and practice teaching. The students working for the associate in agricultural education title are required 18 units and the students taking the bachelor of science in agricultural education degree 33 units of these professional education courses.

The curriculum offers to the students general education consisting of English composition, world literature, public speaking, scientific reporting, physics, chemistry, general botany, economic zoology, hygiene and physical education, making a total of 36 units for the associate in agricultural education, and 52 units for the bachelor of science in agricultural education.

A unique feature of the Central Luzon Agricultural College curriculum is the requirement of practicum. It is a special instruction requiring 10 hours a week, carrying five units of credit. It consists of actual work experience in shops, poultry and pig raising, rice farming, vegetable growing, fruit growing, onion culture, and raising such field crops as sugar cane, corn, camote, etc. The ideas, theories, and principles learned in the classroom are put into practice in the field during the two-hour period for practicum. Learning by doing and the development of desirable skills are the results. The value and dignity of work is emphasized and the "white-collar" attitude is forestalled.

Committee on Training Teachers of Agriculture

On March 25, 1953, the Secretary of Education, the Honorable Cecilio Putong, appointed a committee headed by President Arcadio G. Matela of the Central Luzon Agricultural College to survey the requirements for teacher-preparation institutions for the training of teachers of gardening and elementary farming in the elementary schools and of agricultural courses in the agricultural and rural high schools, as well as in the general high schools, both public and private, including the curriculum, building and site, equipment, as well as qualifications of members of the faculty.

The other members of the committee are: Professor Francisco Sacay, College of Agriculture, University of the Philippines; Demetrio M. Andres, Chief, Instruction Division, Bureau of Public Schools; Pantaleon Lumlao, Supervisor, Bureau of Private Schools; and Hilario J. Santos, Acting Chief, Vocational Education Division, Bureau of Public Schools.

This committee is ready to submit its findings and recommendations. It is hoped that a day will soon come when agriculture can be taught well by teachers who are so technically and professionally trained as to be able to instruct, inform, and inspire their students to turn to man's oldest profession — agriculture.

I have discussed the progress of the agricultural education program in the Philippines, the phases of agricultural education, and the training of teachers of agriculture. Because agricultural development is the need of the hour, there is intensification of agricultural education in our schools and colleges to make such education available to more students and more attractive to the people. It is hoped that, in the near future, there will be at least three agricultural schools in each province. People must see that agriculture pays, that it is a dignified, enjoyable, and profitable profession. Agricultural education in our schools and colleges can make agriculture a rich and attractive profession. In this age where there is an oversupply of professional intellectuals for white-collared jobs, it is a happy sign to see people turning to agriculture as the country's means of salvation toward economic self-sufficiency. With a successful program of agricultural education, we can envisage improved conditions of agriculture. With this, there will be resulting economic stability and widespread prosperity in the Philippines.

The capacity of one group of petroleum storage tanks is now measured in bushels instead of barrels. Giant tanks near the Cushing field in Oklahoma, built to store oil but now outmoded by modern conservation practices of the oil industry, are being used to store United States government surplus wheat. Wheat can be kept in the storage tanks for years without the loss of a single grain from spoilage. Oil men often place their ingenuity at the service of others in unexpected ways. — *Petroleum Newsnotes.*

If the handle of your screw driver or hammer is sticky from friction tape that has been removed, apply a thinned coat of fresh, white shellac and allow it to dry. — *Shellac Information Bureau.*

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

WRITING REQUISITIONS

HERE it is time for the May issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION again. That should remind us of the annual chore of making out requisitions for the things needed in our shops during the next school year.

Requisition time may be a rough period for teachers who have not developed a system of records showing what and how much materials and supplies had to be ordered from year to year. If you have such a record the job of requisitioning is comparatively easy, and takes a minimum of time.

A very good system was presented by Denver Sams and William H. Mason, instructors at Purdue University, Lafayette, Ind., on page 143 in the May, 1952, issue of this magazine. These authors have developed a good workable system which materially cuts down the time that has to be spent in writing requisitions.

As the first step they suggest the classification of all expendable supplies used throughout the years. From their own experience they found that the supplies used by them could be placed under the following headings: *A* — Abrasives, *B* — Ceramic supplies, *C* — Electrical supplies, *D* — Etching supplies, *E* — Expendable tools, *F* — Finishing supplies, *G* — Graphic-arts supplies, *H* — Hardware, *J* — Leather supplies, *K* — Metals, *L* — Miscellaneous, *M* — Plastic supplies, *N* — Soldering supplies, *O* — Upholstering supplies, *P* — Woods. Each of the items were also given a designating letter.

As an example they showed how wood items are listed: P-1 cherry, 1 in.; P-2 cherry, 2 in.; P-3 walnut squares, 2 by 2 by 30 in.; P-4 birch dowel rod, ½ in.; P-5 fir plywood, ¼ in.; P-6 mahogany veneer.

Of course, these lists can be altered to suit the conditions met with in the various types of shops.

Requisition forms which can be used to keep a record of the total units of a specific item ordered at various times of the year must then be devised. This form should show the name of the item, thus "Cherry lumber 1 in. thick, random widths and lengths, firsts and seconds, rough, kiln dried." The classification "P-1" also should be indicated. Then the name and address of the firm from which the purchase was made should be entered, together with the estimated unit cost, the date when purchased, the date and the quantity received, then the actual unit and total cost.

Of course, all of this takes time while it is in the developmental stage. However, this system or a similar one, when once put into use, will soon show its worth, and it will be found to be worth its weight in gold when the time for the annual requisition time arrives.

THE JETS CLUBS

MICHIGAN STATE UNIVERSITY, East Lansing, Mich., originated the Junior Engineering Training for Schools (Jets) Club, in 1950 in order to do for the regular high school students what the 4-H and FFA clubs have long been doing for students taking agricultural subjects.

The first Jets Club was organized in the East Lansing high school in November of 1950. Since then the program has grown to include 75 clubs in 18 states with an active membership of over 2000 boys and girls.

The idea for the Jets originated with Lorin G. Miller, retired Dean of Engineering at Michigan State University. He had the idea that there should be a "4-H club of engineering" to show young people what engineering is and what it has to offer to our youth. That is exactly what the Jets program aims to do.

Jets headquarters is located at Michigan State University. From there kits listing interesting engineering information are distributed to new clubs and a list of numerous motion pictures is included. A club newsletter, "Jets-O-Gram" also is circulated to all clubs.

Michigan State University offers Jets members who are outstanding students a scholarship program. Each club is entitled to give such a scholarship which covers four years' tuition at the Michigan State University to its best student.

Because the Jets clubs do much to emphasize mathematics and science, as a must to members who want to take up engineering at the University, there are comparatively few dropouts once these youngsters have started on their engineering courses. It is the belief of those who are sponsoring these clubs that the Jets program will do much to boost America's race with Russia for trained engineers.

The success of the program has brought appeals for information about the clubs from many engineering schools, engineering societies, and industries. It is to be hoped that the movement will spread and grow, and that it will have the success enjoyed by 4-H and FFA clubs.

SUMMER SCHOOL

IT IS high time to arrange for admittance to the college of your choice if you have the intention to attend summer school this year.

Write to the Director of Summer Session of the institution selected and he will send you complete information and a bulletin of the school you have chosen.

The following partial list of institutions has been added to make it easier for you to decide which one you wish to attend.

Bradley University, Peoria, Ill.

First term, June 11–July 16. Second term, July 17–August 18.

Colorado A. and M. College, Fort Collins, Colo.

Four-week Terms: June 18–July 13; July 16–August 10.

Milwaukee School of Engineering, 1025 North Milwaukee St., Milwaukee 1, Wis.

Terms start April, July, September, January.

New York University, Washington Sq., New York 3, N. Y.

Intersession, June 29–July 4; summer session, July 2–August 10; post session, August 13–September 7.

Oregon State College, Corvallis, Ore.

Summer session, June 18–August 10.

State University of New York, Oswego, N. Y.

Art metal, advanced electricity, furniture design and construction, and metals technology, July 2–13.

Curriculum Workshop in vocational education, administration and supervision, July 2–August 10.

Curriculum Workshop in industrial arts, July 16–August 10.

Driver training institute, August 13–24.

The Pennsylvania State University, University Park, Pa.

Intersession, June 11–June 29. Main session, July 2–August 11. Post session, August 13–August 31.

Stout State College, Menomonie, Wis.

Pre-summer session workshop, June 18–23.

Six-week and three-week periods — graduate and undergraduate programs, June 25–August 3.

University of Minnesota, Minneapolis 14, Minn.

First term, June 11–July 14.

Second term, July 16–August 18.

Wayne University, 5442 Second, Detroit 2, Mich.

Six, eight, or ten weeks. June 25.

Problems and Projects

A SMALL ELECTRIC MOTOR

RICHARD B. HAGE
Industrial Arts Instructor
Eastlake Junior High School
Willoughby-Eastlake Schools
Willoughby, Ohio

The electric motor described herewith was designed primarily for the seventh grade student. Older students in electricity or science also can build it. If the teacher so desired, a more difficult motor could be made from this basic design by tapping, drilling, countersinking, and using flathead machine screws to hold the pillow blocks to the base, rather than attaching with a plastic solvent. A more difficult motor might even have feet on the base or a conventional-type commutator or brushes.

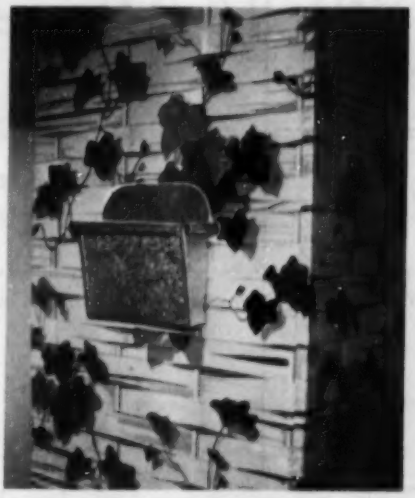
Basic characteristics of this motor are as follows:

1. It is small in size.
2. Low in cost — about 15 to 20 cents.
3. Using plastic for the base and the pillow blocks, and attaching them together with methylene dichloride or some other plastic solvent simplifies the construction.
4. The lead and end wire of the armature are used for the commutator. The end of the field winding is used as one of the brushes, so only one more wire is needed for another brush.
5. The jig and method of forming the field simplify instruction.

ROLLED EDGE NAPKIN HOLDER

ASH BARTO
Industrial Arts Department
High School
Bay Shore, N. Y.

Are you looking for something different in the way of a practical sheet-metal project? Perhaps this rolled edge napkin holder described and illustrated herewith is the answer. It incorporates a number of the basic sheet-metal operations and at the same time is functional and easily made.



Rolled edge napkin holder

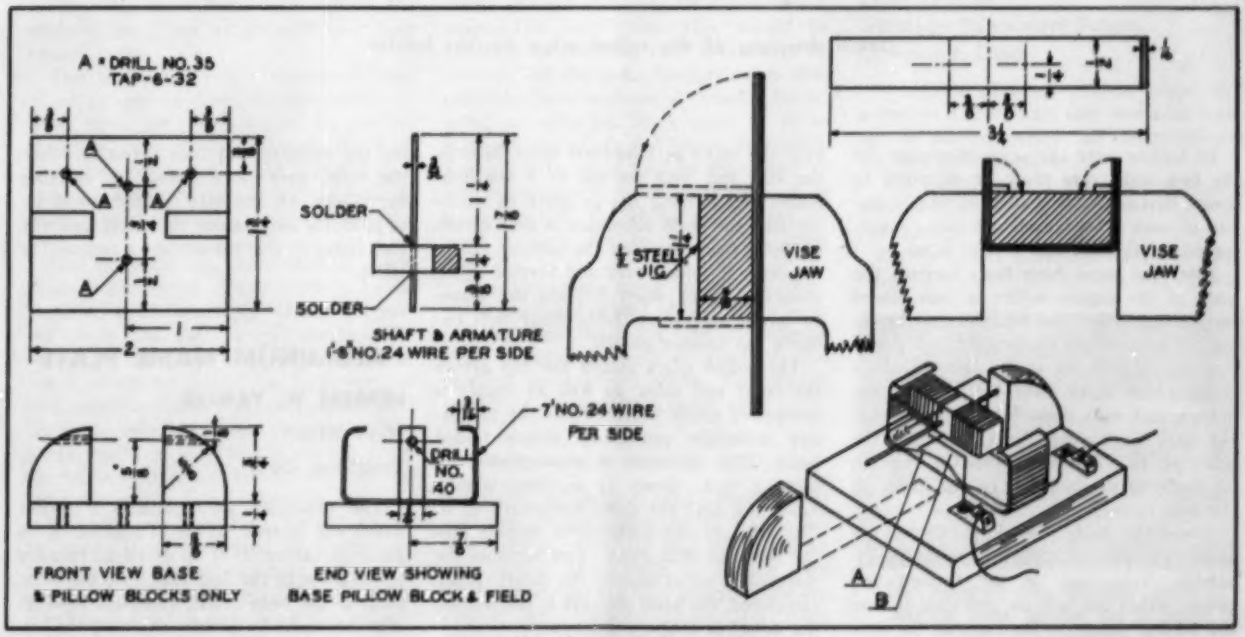
The basic operations for its construction consist of: use of the squaring shear, layout tools, tinners shears, bar folder, as well as the hand drill or drill press. In addition to these tool operations, there is the forming of the hem, seams, and rolled edges.

Utilizing the embossed aluminum sheet stock, the entire project can be made from a piece cut to a dimension of 7 by 19 in.

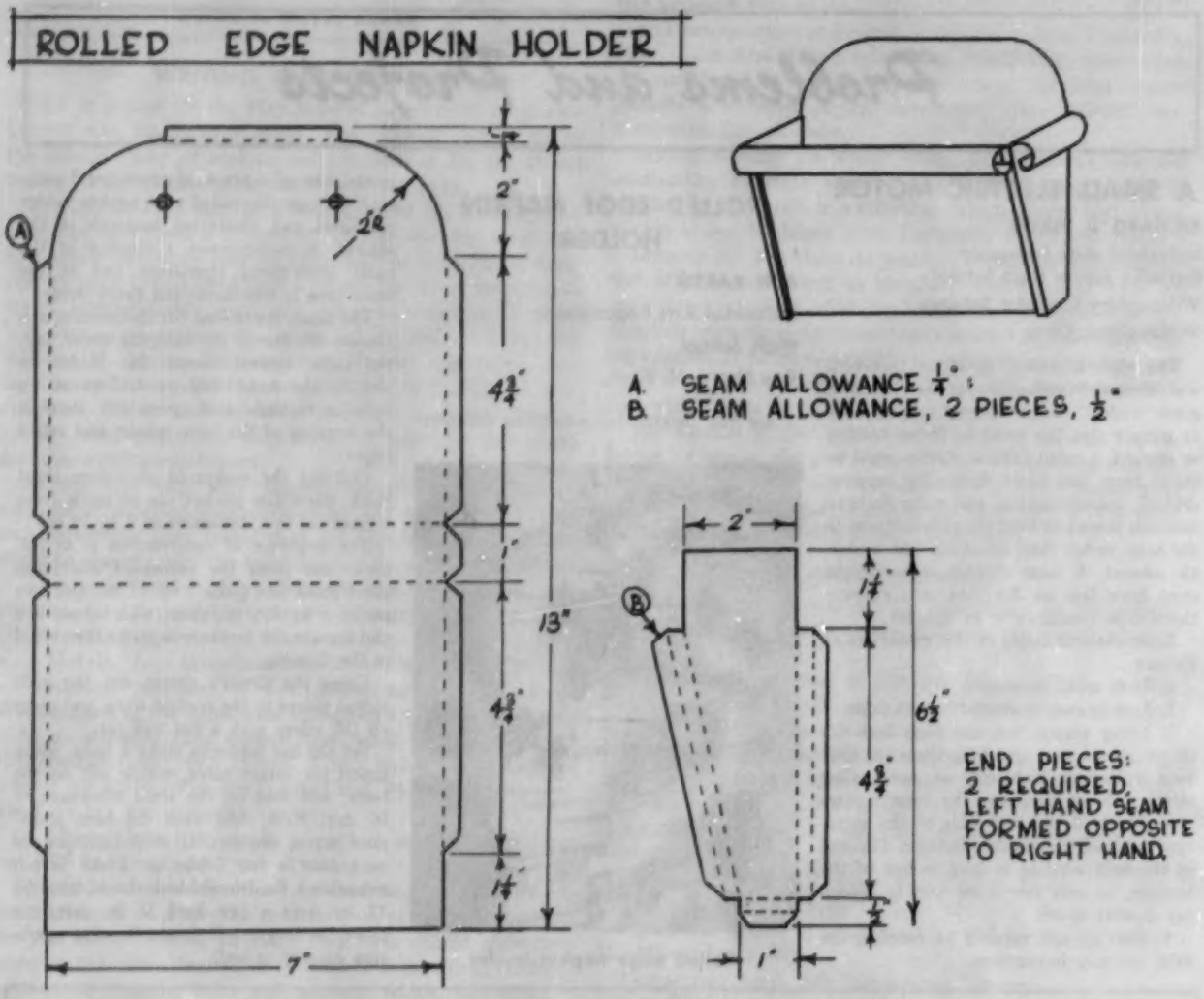
The sequence of construction is as follows: cut from the embossed aluminum sheet stock one piece 7 by 13 in., and two pieces 3 by 6½ in., paint with layout dye and lay out the measurements as illustrated in the drawing.

Using the tinner's shears, cut the individual pieces to the scribed lines, and dress off the edges with a flat mill file.

Set the bar folder to make a ¼-in. seam. Insert the larger piece, which will be the body, and fold up the seam allowance to 90 deg. Next, fold over the hem allowance across the top. If shop facilities are such that a bar folder or brake is not available a hardwood block cut ¾ by 3 by 12 in. with a saw kerf ¼ in. deep cut down the length will do the bending operation equally as well.



Details of the electric motor



Detail drawing of the rolled edge napkin holder

In folding over the seam allowance for the two ends, care must be exercised to insure that both are mated, or bent opposite to each other, forming a pair consisting of a left hand and a right hand.

After the parts have been formed, the body of the napkin holder is then placed on the flat end of the beak-horn stake, or use the edge of the hardwood block placed in a vise, line up the 45-deg. notches which indicate the bend lines for forming the bottom and with slight hand pressure fold the back to 90 deg. Next, move to the other set of notches and fold the front to an angle which is equal to the front of the side pieces.

After the body has been formed to shape, the napkin holder is ready to assemble. Take one of the formed end pieces, either one will do, and slide it over the 90-deg. flange on the body of the napkin holder. In turn these pieces are placed over the stake or hardwood block held in the vise and with the aid of a raw-hide mallet and backing bar or block of suitable size, the seam allowance is first closed up snug, then removing the backing block, the seam is folded over and formed. Care should be given when forming the seams to insure neat sharp folds which will enhance the finished results.

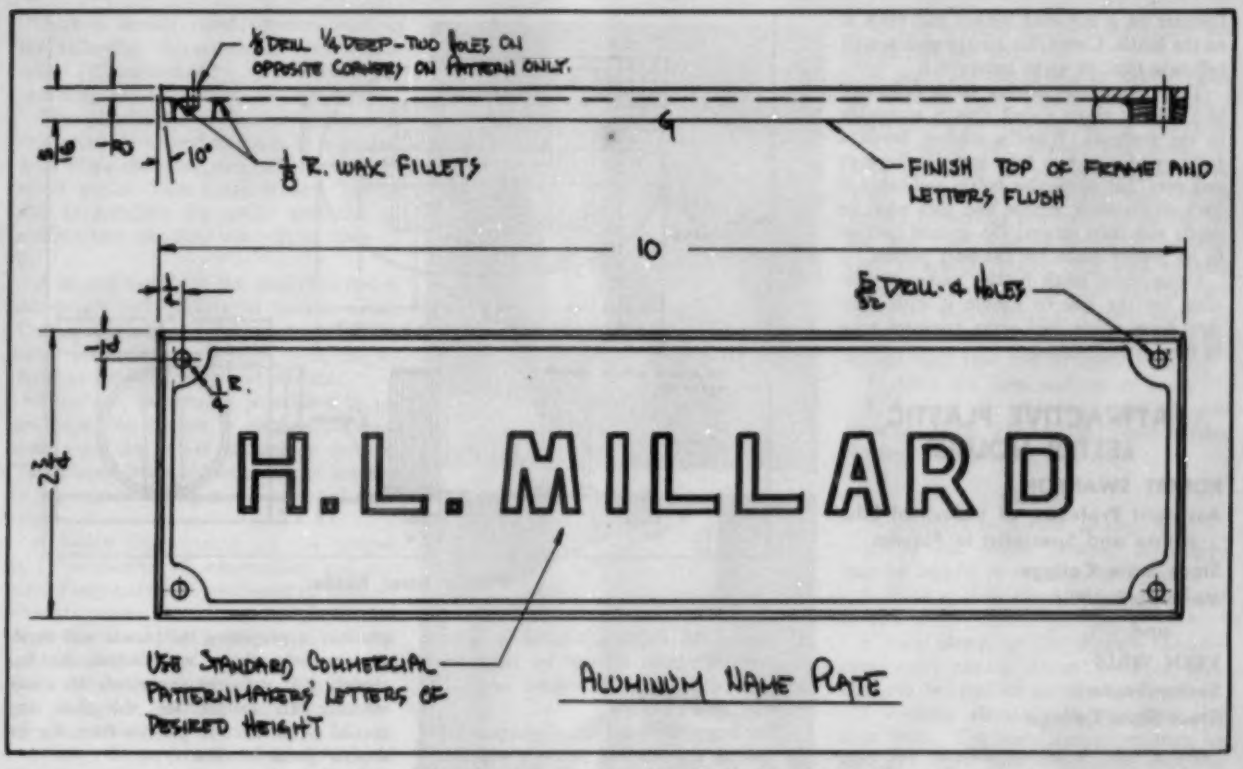
The rolled edges stiffen the top across the front and sides, as well as supply a decorative touch which breaks the monotony ordinarily caused by simple folded hems. This operation is accomplished by using a ⅝-in. dowel 12 in. long, with a ¼-in. saw kerf cut down the length of it. The edge of the material is slipped into the kerf and with steady, firm pressure the material is rolled around the dowel. When completed, the hand pressure is relaxed and the dowel is easily withdrawn.

Finishing consists of merely steel wooling the surfaces and then polishing, after the holes have been drilled for hanging the holder. An alternate method would be to paint the surface and then steel wool the high lights to give the surface a contrasting effect.

ALUMINUM NAME PLATE

HERBERT W. YANKEE
High School
Stratford, Conn.

The aluminum name plate is a project which will interest all pupils because of its personal nature. It is an excellent foundry project due to the fact that once the basic pattern has been made, countless castings may be made by simply changing the letters. If, for instance, a name and title is


DRILL ¼ DEEP – TWO HOLES ON OPPOSITE CORNERS ON PATTERN ONLY.
10°
R. WAX FILLETS
FINISH TOP OF FRAME AND LETTERS FLUSH
10
DRILL 4 HOLES
R.
H.L. MILLARD
USE STANDARD COMMERCIAL PATTERNMAKERS' LETTERS OF DESIRED HEIGHT
ALUMINUM NAME PLATE

Details of the aluminum name plate by Herbert W. Yankee

required on the sign, smaller letters may be substituted. If shaping or milling the rough casting is inconvenient, the top surfaces and edges can be flat filed to produce a good surface. This can be followed by using emery cloth to further refine the finish. Since the material is aluminum, the surfaces may then be polished to a high luster.

The name plate has a variety of uses. It can be used on doors, driveway markers, desk signs, or for counter or window markings. It is possible for even the most inexperienced pupil to make a highly professional appearing sign and could well be offered to a beginning class in foundry work.

It is suggested that the pattern be made from mahogany if repeated use is to be made of it. To facilitate lifting the pattern from the mold, a ten degree draft should be provided. Two ⅛-in. diameter holes should be drilled ¼ inch deep in two opposite corners so the pattern can be easily removed from the mold. Wax fillets should be used on the pattern along the inside corners which will make removal from the mold a simple operation.

Standard patternmaker's letters should be used. These are glued to a strip of paper cut to the approximate width and length of the line desired. This paper is glued to the sign board. When the pattern has been cast, the paper may be easily removed from the pattern, and the letters from the strip of paper.

After casting the sign, 5/32-in. diameter holes are drilled in each of the four corners for holding purposes. The surfaces are then wire brushed to remove any traces of sand and then are either milled, shaped, or hand filed. This should be followed by polishing to a high luster on a wheel. All the lower background is then painted with a commercial "crackle finish" paint, or with flat black paint so as to highlight the letters and frame. If desired, a pine pattern may first be made and an aluminum pattern made from this. It is suggested that the aluminum pattern be used if signs are to be cast in large quantities.

The aluminum name plate was effectively used as a school project. Signs were cast for each classroom door and smaller name plates were made of identical proportions for teacher's desks. The project proved to be a very popular one.

Oil and gas drillers sank about 26,000 wells to an aggregate depth of 20,100 miles during the first half of this year — a record. More than 1.2 million tons of the steel "oil country goods" used by drillers was shipped from steel mills during the same period. — *Steel Facts.*

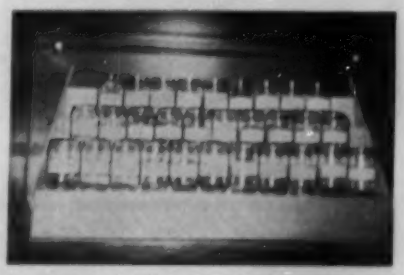
STORAGE OF NAILS, BRADS, AND SCREWS IN THE HANDICRAFT SHOP

JAMES BASILONE
Craft Teacher
Giddings Elementary School
Cleveland, Ohio

A method of keeping nails, brads, and screws in a nice, neat, and accessible manner is one in which all industrial-arts teachers are interested.

The method that I use is a simple and effective one and yet very inexpensive to the teacher.

Simply collect a number of empty baby food bottles and type the size and kind of



A method for storing nails, brads, and screws on a rack or in a cabinet

fastener on a gummed sticker and stick it on the bottle. Cover this sticker with scotch cellulose tape so as to preserve it.

Then place the bottles in a neat row in a cabinet or on a rack that is accessible to the students. When a student needs a fastener of a certain type and size, he goes and gets that particular bottle and takes it back to his work station and uses what he needs and then returns the unused portion to its proper place for the next person.

Using these small bottles makes it possible for the boy to handle it with ease, cuts down waste, and saves frequent trips to the fastener cabinet.

ATTRACTIVE PLASTIC LETTER HOLDER

ROBERT SWANSON
Assistant Professor of Industrial Education and Specialist in Plastics
Stout State College
Menomonie, Wis.

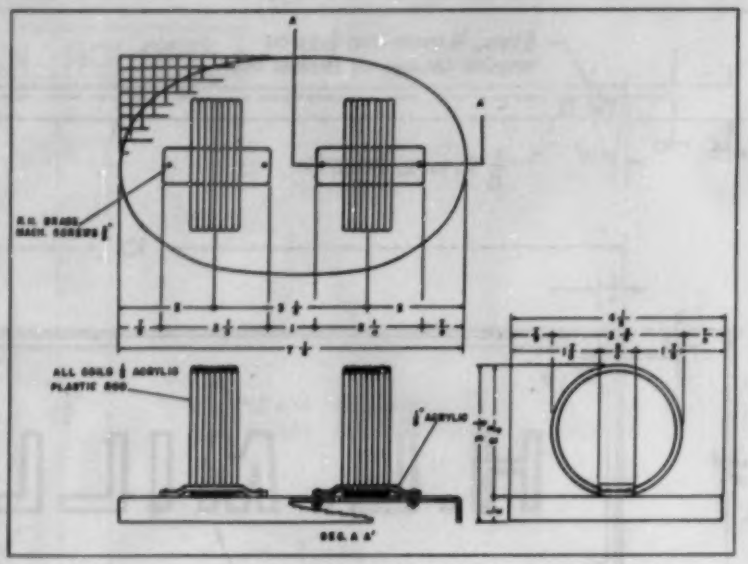
and

VERN WILLS
Senior Student
Stout State College

As a rule, it is not difficult for shop teachers to obtain the immediate interest of beginning students in plastics work. However, the important thing is not to destroy that basic interest by requiring a student to do excessive coping saw work, sanding, and filing.

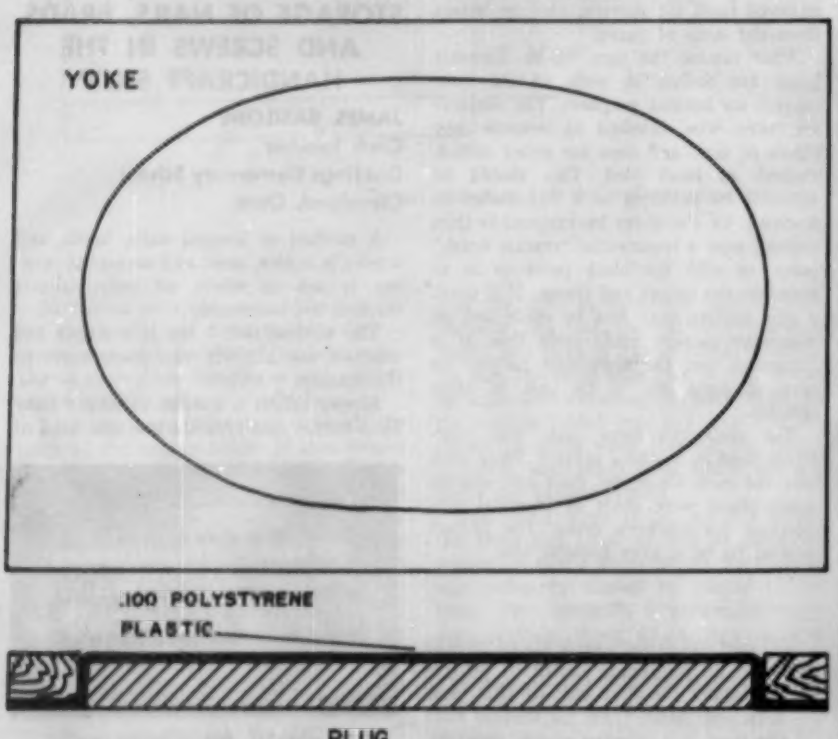
Too many units involving plastics begin by having the student make a windshield scraper or similar plastics object. He is immediately disheartened because the operations in preparing the plastic will duplicate exactly those with which he has already had sufficient experience in woodworking. He cannot see, therefore, any special significance in plastics from the industrial point of view.

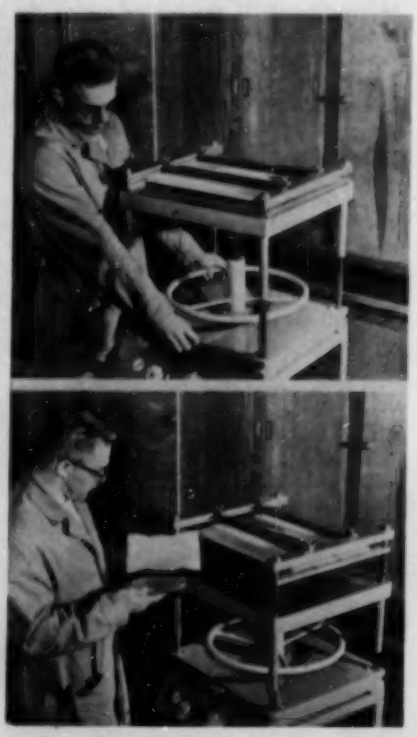
Instead that student must come to realize the advantages of plastics over other materials. An instructor can easily achieve this objective by careful selection of appropriate projects in plastics.



Plastic letter holder

FORMING SET-UP FOR BASE





Figs. 1 and 2. Forming the base, and inspecting the formed base

Such a project should possess most of the following characteristics: (1) usefulness, (2) individuality, (3) modern appearance, (4) originality, (5) simplicity.

The plastics letter holder featured in this article is a good example of a project with those characteristics. First, the project is useful. Thus every student will be able to complete the holder with the assurance that adequate use will be made of it.

A second quality of the project is that it encourages individuality of student effort. This quality comes from the fact that the letter holder may be altered to fit the individual needs and skills of students.

Then, too, the project is modern in appearance. No student is anxious to complete work that is not pleasing to the eye. This plastic letter holder can hold its own in appearance among any commerical creations.

A fourth characteristic of this project is its originality of construction and design. Frequently it is necessary to have an unusual project to attract and hold student attention. The novel design of this letter holder does not, in any sense, detract from the holder's usefulness. The attractive coils, for example, are different but very functional.

Finally, the project is sufficiently simple. Too frequently students become discouraged because shop operations appear difficult. In this project, however, jigs and fixtures are already made. The operations necessary to construct the letter holder are such that even the student of minimum skill can easily complete them.

When an instructor notes that the aforementioned five important project considerations are incorporated into the construction of this letter holder, he indeed has justification for using it with beginning students in plastics work.

This is the general procedure for making the plastic letter holder.

Base

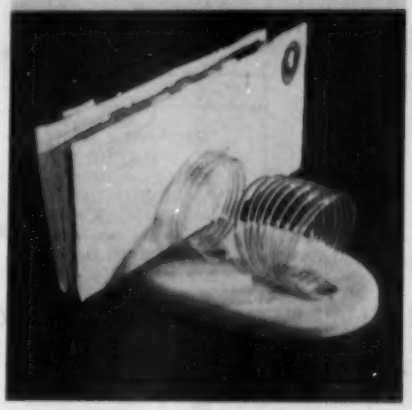
1. *Make the plug.* A close-grained hardwood such as maple is very good, although softer woods may be used. Sand the plug until very smooth. Use no finish because heat may cause it to become sticky.

2. *Make the yoke.* Cut out the yoke as much larger all around as the thickness of the plastic being used. Round all arrises to an approximate ⅛-in. radius and carefully smooth the cutout portions to avoid scratching when the plastic stretches.

3. *Cut out the plastic.* Polystyrene plastic can be most easily cut with a squaring shears. Cut the plastic 2 in. wider and 2 in. longer than the size of the base of the plug.

4. *Clean the plastic.* With a clean, dry cloth, remove all dust and lint from the surface of the plastic.

5. *Set up the forming equipment.* Position the plug on the platen so that it is centered in the hole of the yoke.



Figs. 3 and 4. Making the plastic coils, and the finished letter holder

— Photographs by Stout State College Visual Center

6. *Heat the plastic at 325° F. until it becomes pliable.* About 3 to 5 minutes will be needed for this operation.

7. *Remove the plastic from the oven and place it in proper position on the plug.*

8. *Form the base to its required depth.* Raise the platen to force the plug and plastic up through the opening in the yoke.

9. *Allow the plastic to cool.*

10. *Remove the formed piece and plug from the yoke.*

11. *Remove the plug from the formed piece.*

12. *Inspect.* If the base did not form properly, reheat and reform.

13. *Trim the plastic.*

14. *Smooth all edges.*

Coils

1. *Select acrylic plastic rod.* Each coil requires a plastic rod 6 feet long.

2. *Select a form for forming.* Any object which is cylindrical in shape may be used. An ordinary glass jar works quite well. The diameter of the form will be the finished inside diameter of the plastic coils.

3. *Prepare equipment for forming.* Place the form and masking tape near an oven.

4. *Use a cloth to clean the plastic rod of all lint and dirt.*

5. *Heat the plastic rod at 325° F. until it becomes quite pliable.* About 3 to 5 minutes will be required for this operation.

6. *Remove the plastic rod from the oven and wind the rod around the form.* This is a very important step. Work rapidly before the rod cools. If all the rod has not been formed before it becomes cool, secure all formed coils with masking tape. Then replace both form and coil into the oven for reheating. Repeat until all the rod is formed. For best results, heat the rod no more than two or three times.

7. *Allow the form and coil to cool.*

8. *Remove the masking tape and coil from the form.* The coils may now require cleaning with a clean, soft cloth.

Clamps

1. *Select ⅛ in. acrylic plastic.*

2. *Cut out plastic clamps.* A pattern may be helpful in making the layout.

3. *With a cloth clean clamps of all lint or dirt.*

4. *Heat clamps at 350° F. until they become quite pliable.* About 10 to 12 minutes will be required for this operation.

5. *Remove clamps from the oven and then form.* The coils themselves may be used as a form. Such a technique gives the clamps the shape necessary to hold the coils in proper position.

6. *Drill ⅛-in. holes.*

7. *Smooth and polish all edges.*

Assembly

1. *Lay out and drill holes in the base.*

2. *Assemble by fastening the coils to the base with clamps.*

VERTICAL STOCK CUTTING DEVICE FOR CIRCULAR SAW

RAY C. DOANE
Columbia, Mo.

There are many operations which require the stock to pass over the circular saw

Fig. 1. Vertical stock cutting device by Ray C. Doane

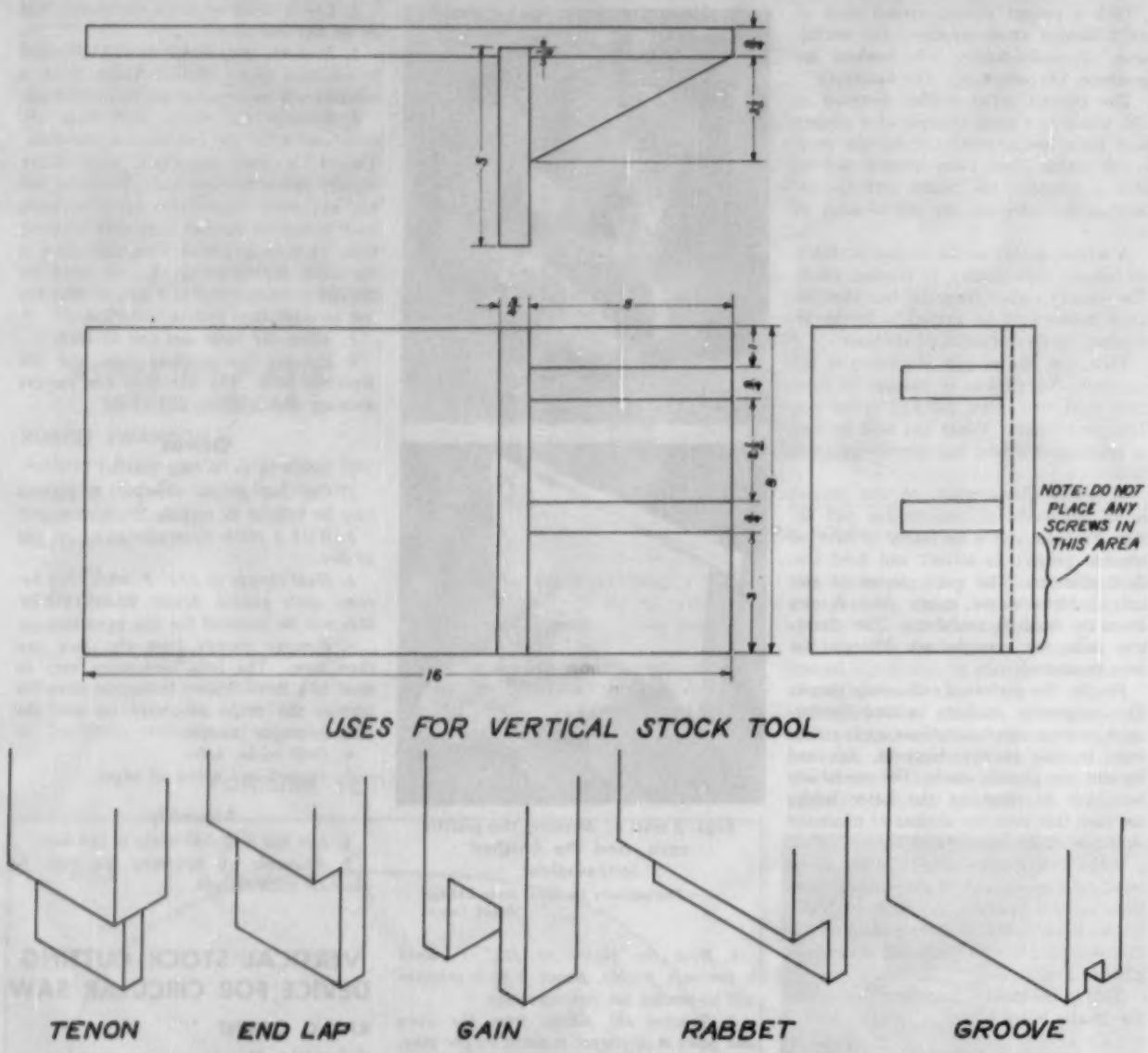


Fig. 2. Details of the vertical stock cutting device

blade while in an upright position. Stock in this position has a very small area for a bearing surface against the table of the circular saw. Accident prevention is the first and last word for these situations.

The vertical stock cutting tool, as shown in Figures 1 and 2, is a valuable accessory for many circular saw operations. The tool is essential for cutting accurately and safely tenons for mortise-and-tenon joints, end lap joints, rabbet joints, gain joints, and grooves. The vertical stock cutting tool is unique in that stock placed in an upright position may be clamped firmly. This enables the operator of the circular saw to perform the operation with little concern about the small area as a bearing surface against the table. The rip fence is needed as a guide.

Plywood is the recommended material for the vertical stock cutting tool. Pieces should be fastened with screws and glue.

CERAMIC EQUIPMENT, TOOLS AND SUPPLIES

VERNON D. SEELEY

Oneonta, N. Y.

Equipment

KILNS
- Ceramic, porcelain, copper enameling, test

KILN EQUIPMENT
- Pyrometer, kilnguard, time switch
- Kiln shelves, posts, stilts, saddles

POTTER'S WHEEL
- Electric, kick
- Turning tools
- Scrapers
- Trimming tools
- Plaster wheel heads

SPRAY EQUIPMENT
- Sprayer — electric, hand
- Spray booth
- Spray mask
- Turn table

MODELING TOOLS
- Boxwood tools, assorted shapes
- Wire loop
- Steel
- Lace tool
- Fettling knives
- Spatulas
- Special flower making tools

PLASTER WORKING EQUIPMENT
- Mold forms
- Mixing bowls
- Scrapers — plain, saw-toothed
- Knife

DECORATING EQUIPMENT
- Bench whirler — aluminum, plastic
- Brushes
  - ½-in. glaze

¼-in. glaze
Red sable decorating brushes No. 2/0, 1, 2, 3, 4, and 5
Squirrel or camel hair utility brushes, No. 1, 2, 3, 4, 5, 6, 8, and 12
Gold writing pen
Sgrafitto tools

MISCELLANEOUS
Sieves, scales, cellulose sponges, pitchers, measuring jars, storage crocks, rolling pins, mortar and pestle, jars, elephant ear sponges

Material List

CLAY
Modeling — moist or dry
Red, white, buff
Slip casting
Prepared or dry

GLAZES
Majolica
Prepared brushing
Dry spraying
Antique
Matt
Spill base
Pattern base

MOLDS
Plaster of Paris
Mold soap
Commercial molds
Pop out mold releasing compound

COPPER ENAMELING
Copper
Copper shapes
Copper kleener
Enamels
Transparent, opaque
Thread, lumps
Jewelry findings
Earwires, pin backs, cuff links, bracelet parts, chains

MISCELLANEOUS
Crystals
Stains
Gold, silver
Overglazes
Gold off
Decco-felts
Underglaze colors, opaque and transparent
Metallic oxides
Kiln wash
Sodium silicate

The following is a list of equipment and materials suggested for a beginning course in ceramics as part of a general shop program. Recommended where budget is limited.

	Approx. Price
Electric kiln — 11 by 11 by 6½ inch firing chamber	$ 60.00
Kiln furniture, cones, shelf, posts, stilts and kiln wash	7.00
200 lb. moist modeling clay white	10.00
6 assorted boxwood modeling tools	1.20
1 set underglaze decorating colors	5.00
Pyrometer for kiln	22.00
6 fettling knives	3.00
3 Plastic bench whirlers	8.85
6 assorted camel or squirrel brushes	1.80
4 ¾" glaze brushes	4.00
4 sable decorating brushes	2.00
6 elephant ear sponges	2.40
1 gal. clear brushing glaze	6.95
6 qt. assorted colors brushing glaze at $3.50	21.00
12 gal. white casting slip, prepared at $1.30	15.60
8 assorted plaster molds	20.00
Total cost	$200.15

The "SkyCav," an Army unit employing helicopters, fixed wing aircraft, jeeps, and tanks, has been organized. — *Public Information Office.*

SHEET METAL EQUIPMENT, TOOLS, AND SUPPLIES

DONALD L. WOLF
Sheet Metal Instructor
Milwaukee Vocational and Adult Schools
Milwaukee, Wis.

These maximum lists may be found helpful in checking inventories, or preparing budgets. If possible each shop should have access to a projector so that slide films, silent, or sound movies may be used by the students in the industrial arts and vocational education courses.

BENCHES
1. Movable — various sizes
2. Instructor's
3. Layout
4. Machine standard
5. Soldering
6. Stake bench with bench plates

BULLETIN BOARD
CABINETS
1. Storage
2. Wardrobe

CHAIR — swivel
CHALK BOARD
DESK — teacher's
EXTINGUISHERS — Pyrene
FURNACES — Gas for soldering

Sheet Metal Shop Equipment — Machines and Tools

ANGLE IRON BENDER — ¼ by 2 by 2-in. capacity
ANGLE IRON NOTCHER — ¼ by 2 by 2-in. capacity
ANGLE IRON SHEAR — ¼ by 2 by 2-in. capacity
BAR FOLDERS — 30 or 36 in.
BENDER — accessories and stand
BRAKES
1. Box and pan — 48 in.
2. Cornice — 48–120 in.
3. Power press — 48–120 in.

DRILLS — electric
1. ¼-in. capacity
2. ⅜-in. capacity

DRILL PRESS — ⅝-in. capacity
FORMER — slip roll — 16-ga. capacity
GRINDERS — 6-in. wheel
LOCKFORMER — No. 22 including
1. Double seaming rolls
2. Drive cleat rolls
3. Motor
4. Power flanger — 22-ga. capacity

NIBBLER — 12-ga. capacity
NOTCHER
PUNCH PRESS — 10-ga. capacity
PUNCH — deep throat — 3/16–¾ in. capacity
ROLLERS — power slip — 10-ga. capacity
ROTARY MACHINES
1. Beading — 18-ga. capacity
2. Beading and crimping — 20-ga. capacity
3. Burring — small and large — 20-ga. capacity
4. Easy edger — 20-ga. capacity
5. Elbow edger — 20-ga. capacity
6. Setting down — ⅛–½-in. seams
7. Turning — 20-ga. capacity
8. Wiring — 20-ga. capacity

SEAMERS — double — 22-ga. capacity
SHEARS
1. Beverly
2. Gap
3. Nibbler
4. Ring or circular — 20-ga. capacity
5. Squaring — bench type
6. Squaring — power — 30–120 in.
7. Slitting — 48–96 in.
8. Unishear

WELDERS
1. Acetylene — including hoses, cutting torch, tips, etc.
2. Arc — including cables, rod holders, and helmet
3. Spot

Sheet Metal Shop — Small Tools

Numerous hand tools are needed in a sheet-metal shop. Tools should be the type used currently in the trade and should be sturdy, simple, and practical. In purchasing tools, particular attention should be given to the alloy content, heat treatment, and guarantee.

ANVIL — 100 pound
AWLS — scratch — 6-in.
BARS
1. Crow
2. Wrecking

BLADES — Hack saw Alternate, Raker, and Wave styles — 24–32 teeth per in.
BLOWTORCH — 1 quart size
BRACE AND BIT — ratchet type — 8-in. sweep
BRUSHES — wire — 6 in.
CALIPERS
1. Inside — 6 in.
2. Outside — 6 in.

CHISELS
1. Cape
2. Cold
3. Diamond point
4. Flat
5. Mortising

CLAMPS
Hand screw — 4–14 in.
COUNTERSINKS — for metal
CUTTERS — bolt — 18 in.
DIVIDERS
1. Quickset — 10–18 in.
2. Spring — 6–10 in.
3. Wing — 6–18 in.

DOLLIES
1. Double seaming
2. Eave trough
3. Hand

DRILLS
1. Breast — ¼-in. capacity
2. Hand — ¼-in. capacity
3. Star — ¼–¾ in.
4. Twist — 1/32–½ in.
5. Hi Speed — round shank — 3/32–⅝ in.

DRILL SET AND STAND — 3/32–½ in.
FIGURES, STEEL
1. Letters A–Z
2. Numbers 1–10

FILES
1. Card and brush
2. Flat bastard — 10 in.
3. Half round bastard — 10 in.
4. Mill bastard — 12 in.
5. Mill smooth — 10 in.
6. Double cut bastard — 12 in.
7. Double cut smooth — 12 in.
8. Rasp half round — 10 in.
9. Round bastard — 12 in.
10. Taper slim — 7 in.
11. Vixen file with holder

GROOVERS — hand — 00–8
GRINDING WHEELS
1. Coarse
2. Fine grit

GRINDING WHEEL DRESSER
GRINDER
1. Bench
2. Portable with motor in head

GAUGES
1. Micrometer
2. U. S. Standard

GROOVING RAIL — grooves 3/16–¾ in.
HACK SAW FRAMES
HAMMERS
1. Ball-peen
2. Claw
3. Cross-peen
4. Raising
5. Riveting
6. Setting

7. Tack
HOLDER — electrode
HOLESAW SET
JARS — earthenware — 1 quart capacity
LEVELS — metal — 24 in.
MALLETS
1. Lead
2. Rawhide
3. Rubber
4. Wood
OIL CANS
OILSTONE — 1 by 2 by 8 in. in iron box
PLIERS
1. Adjustable
2. Button
3. Flat nose
4. Gas pipe
5. Handy seamers
6. Nippers — large
7. Nippers — small
8. Round nose
9. Side cutting
PUNCHES
1. Center
2. Prick
3. Whitney Jr. No. 5
PUNCH SETS
1. Hollow — ¼–4 in.
2. Solid — 3/32–½ in.
PUTTY KNIVES
RIVET SETS — hand — 00–8
RULES
1. Circumference — 24–48 in.
2. Zigzag — 6-ft. folding
3. 12-in. steel graduated in ⅛, 1/16, 1/32, and 1/64 in.
SAWS
1. Crosscut
2. Hack, frame
3. Keyhole
4. Rip
SCRAPER — solder
SCREW DRIVERS — 4–14 in. long — plastic or wood handle with steel shank
1. Offset
2. Phillips
3. Standard
4. T head
SOLDERING COPPERS — 1–10 lb.
1. Bottom
2. Deck or roofing
3. Pyramid
4. Hatchet
5. Electric
SNIPS
1. Aviation — right and left — 16-ga. capacity
2. Bench shears — 16-ga. capacity
3. Bulldog — 16-ga. capacity
4. Circle — 18-ga. capacity
5. Combination — 22-ga. capacity
6. Compound lever — 16-ga. capacity
7. Double cutting — 22-ga. capacity
8. Hawksbill — 20-ga. capacity
9. Pivoteer — 20-ga. capacity
10. Straight — 22-ga. capacity
SQUARES
1. Combination — 12 in. with protractor head and bevel head
2. Steel Carpenters — 12–36 in.
STAKES
1. Ball
2. Beakhorn
3. Bench
4. Bench plate
5. Blowhorn
6. Bottom
7. Candle mold
8. Coppersmiths
9. Creasing
10. Double seaming
11. Double seaming with heads
12. Hatchet
13. Hollow mandrel
14. Solid mandrel
15. Square head
16. Swansneck
STRAIGHT EDGES
TAPE LINE — 50-ft. steel
TRAMMEL POINTS — adjustable metal frame with steel points
UNIVERSAL STAKE HOLDER
VISES — 3-in. jaw — anvil face
WELDING HELMETS
WELDING SHIELDS
WIRE
WRENCHES
1. Adjustable — 8–12 in.
2. Allen
3. Box or closed end
4. Monkey
5. Pipe — 10 and 12 in.
6. Open end set — ⅛–1 in.
7. Spanner
8. S wrench — 8–12 in.
9. T socket — combination

Sheet Metal Shop Supplies

ACID
1. Muriatic
2. Ruby fluid
ACID SWABS
BOLTS — brass and iron — assorted sizes
1. Lag
2. Machine
3. Stove
BROOMS — push
BRUSHES
1. Acid
2. Bench
3. Paint
4. Vegetable
BURRS — iron
1. Black
2. Tinned
BUTTS — ½ by ¾ in. — 4 by 4 in.
1. Brass
2. Steel
CARBON TETRACHLORIDE
CHALK — colored and white No. 777
CHECK — brass — 1 in. dia.
CLEANSER
1. Can
2. Hand
CEMENT — elastic
COMPOUND
1. Cleaning
2. Floor dry
CONTAINERS
1. Paper towels
2. Rags
3. Scrap metal
CURTAINS — welding
ELECTRODES
EMERY CLOTH
EXTINGUISHERS — Pyrene
FIRST AID KIT
FLUX — SOLDERING
1. Sal ammoniac
2. Rosin
3. Rosin paste
GASOLINE — Hi test
GLOVES — welding
GOGGLES
1. Welding
2. Safety
GREASE
GRINDING COMPOUND
HANDLES
1. Bail
2. File — small, medium, and large
3. Hammer — 12 in.
4. Soldering coppers
HASPS — steel hinge — Nos. 3–12
HINGES — steel strap
IRON — angle — ¾ by ¾ by ⅛ in., 2 by 2 by ¼ in.
IRON — band — 1/16 by ¾ in., ¼ by 1½ in.
METAL
1. Aluminum
2. Black iron — 10–30 gauge
3. Brass, sheet — 10–30 gauge
4. Copper, cold rolled — 10–30 oz. Soft — 10–30 oz.
5. Galvanized iron — 10–30 gauge
6. Lead, sheet — 1/32–½ in. thick
7. Monel — 10–30 gauge
8. Steel, blue annealed — 10–30 gauge
9. Terne plate — 12–40 lb. coated
10. Tin plate — 1 C and 1 X
11. Zinc — 10–30 gauge
NAILS
1. Common wire — 2*d*–10*d*
2. Roofing — No. 1–No. 3
3. Lead headed — 2–12 in. long
4. Masonry
NUTS — hexagonal machine screw — No. 6 — 10, 24–32 threads
OIL — lubricating — S.A.E. No. 20
PAINT
1. For shop maintenance
2. Tinners Red
PAPER
1. Asbestos — 1/64–⅛ in. thick
2. Roofing — No. 1–No. 3
PASTE — asbestos
PINS — escutcheon, brass — ½–⅝ in.
PULLEYS — brass or galvanized — 1–3 in.
RACK — paper
RAGS — wiping
RIVETS — assorted sizes with different style heads
1. Black
2. Cherry
3. Tinners
4. Copper with burrs
5. Stainless
6. Aluminum
RODS — threaded
Black and galvanized iron — ¼–⅜ in.
ROOFING —
1. Flat seam — 24 by 60 in.
2. Flat V crimp — 24 by 60 in.
3. Ornamental V crimp — 24 by 60 in.
ROSIN
ROSIN PASTE
SAL AMMONIAC
SALTS, SOLDERING
SCALE — platform, 100-lb. capacity
SCREW EYES
SCREWS
1. Machine — round head — No. 6 — 10, 24–32 threads
2. Sheet metal — No. 6 by ⅜, No. 7 by ½, No. 10 by ¾
3. Wood iron and brass — flat or round heads, Nos. 0–20
SOAP
SHEETS
1. Corrugated — 26 by 60 in.
2. Cross crimped — 24 by 60 in.
SHIELDS — expansion — 3/16–¾ in.
SOLDER — 60/40, 50/50, 40/60, in 1½-lb. bars
STEEL WOOL
TAPE
1. Friction — ½ lb. rolls
2. Rubber — ½ lb. rolls
TOWELS — paper
TURN BUCKLES — iron — ¼–¾ in.
TWINE
SPRINGS — aviation
WASHERS
1. Black iron and brass — 3/16–¾ in.
2. Lock washers — ¼–¾ in.
WEDGES — hammer handle
WELDING FLUXES
WELDING RODS (all rods come in 24-in. lengths)
1. Brazing, 1/16-, ⅛-, 3/16-in. diameter
2. Cast aluminum, 3/16-, ¼-, and ⅜-in. diameter
3. Cast brass, 5/16- and ⅜-in. diameter
4. Cast bronze, ¼-in. diameter
5. Cast copper, 3/16- and ¼-in. diameter
6. Cast iron, 3/16-, ¼-, 5/16-, and ⅜-in. diameter
7. Low carbon steel, ⅛-, 3/16-, and ¼-in. diameter

WIRE
1. Black annealed — 16 to 34 W and M gauge, selected sizes
2. Coppered market — 5 to 18 W and M gauge, selected sizes
3. Coppered spring — 2 to 18 W and M gauge, selected sizes
4. Galvanized — 5 to 18 W and M gauge, selected sizes
5. Piano — Nos. 2/0 to 36, selected sizes
6. Tinned — 16 to 24 W and M gauge

DRAW CHUCK

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Olney High School
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The average draw chuck combination set is rather expensive for the small shop or some school machine shops where the budget is limited. Also there are times when other than fractional sized collets are needed in a hurry.

The draw chuck illustrated here is inexpensive and simple to make in the average small shop. It will fit into a lathe having a No. 4 Morse tapered hole in the headstock spindle or by using an open sleeve if the tapered hole is larger. It is seated tightly with a lead hammer and dislodged by using a wrench on the flats. The flats are also used to hold the body in a vise while tightening or loosening the nut with a hook-spanner wrench.

The collets are made from tool steel or tough alloy steel. The author has made them successfully from discarded automobile axles. The three slots are milled within 1/64 in. of the hole, leaving a web to hold the shape while heat-treating. After heat-treating in oil, the web is removed with a 1/16-in. cut-off wheel.

Any number of blanks can be made available to drill and ream or bore as the occasion requires for standard or special sizes. It is surprising how accurate this arrangement can be without the usual necessity of grinding.

Before the days of the petroleum-powered engine, a farmer spent almost half his working life on the unproductive job of tending and feeding his horses and mules. — *Petroleum Newsnotes.*

A STUDENT'S VACUUM TUBE VOLTMETER

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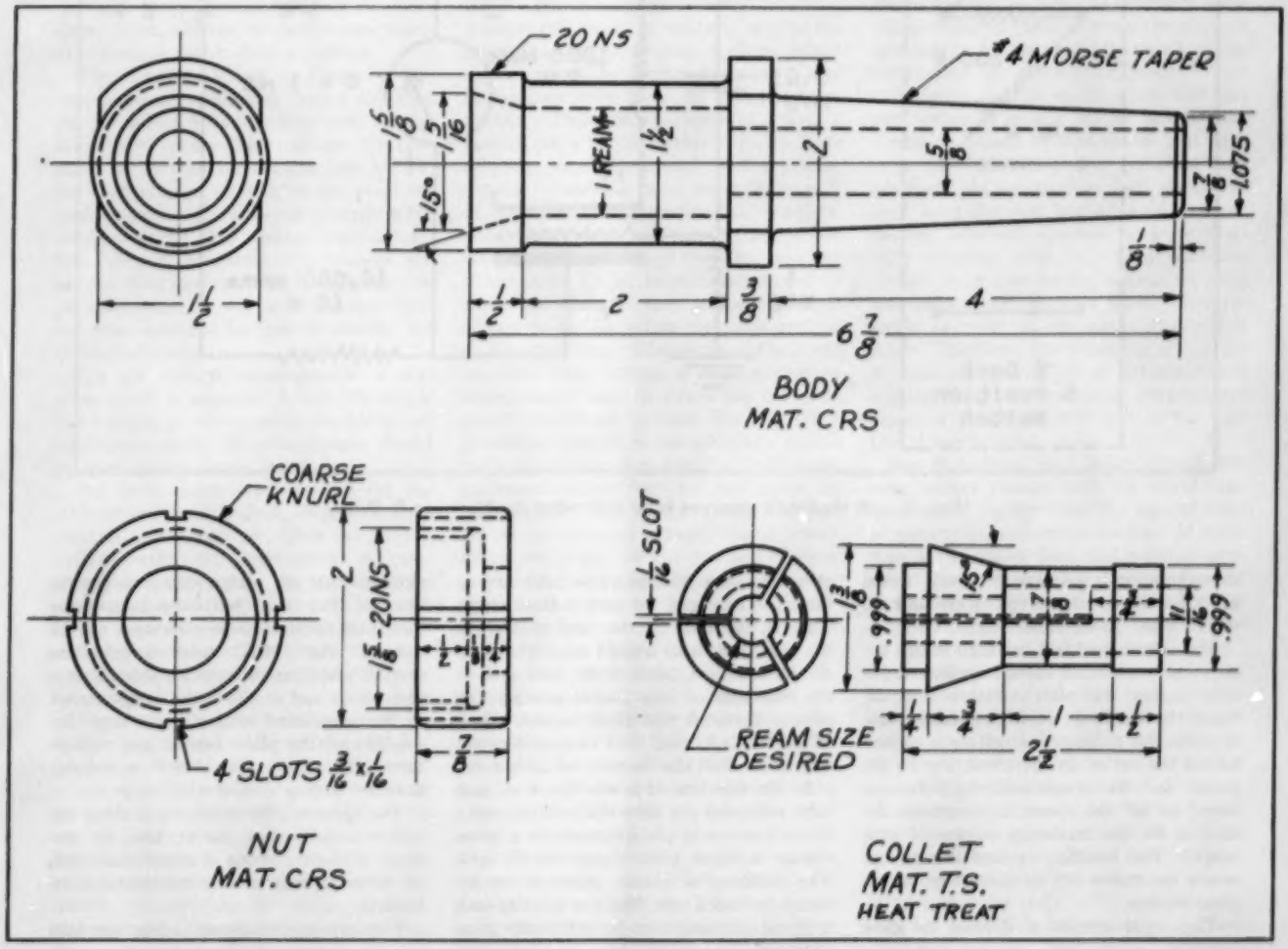
The vacuum tube voltmeter described in this article has four ranges, 0–5*V*, 0–50*V*, 0–100*V*, and 0–500*V*. The circuit utilizes a 0–1 ma d.c. meter with a field resistance of 150 ohms, but this resistance is not critical. Since three of the ranges are identical except for a factor of 10 or 100, only two scales need be calibrated on the face of the meter, the 0–5*V*, and the 0–100*V*. The meter should have its original calibrated 0–1 ma scale, however, otherwise an individual calibration must be made. Few meter scales are perfectly linear, and usually show a small decrease in deflection per unit of current as the deflection is increased. The normal 0–1.0 ma scale can be used without modification if appropriate notice is taken of the range under use. That is, 20 or 0.20 (depending on whether



Details of the draw chuck

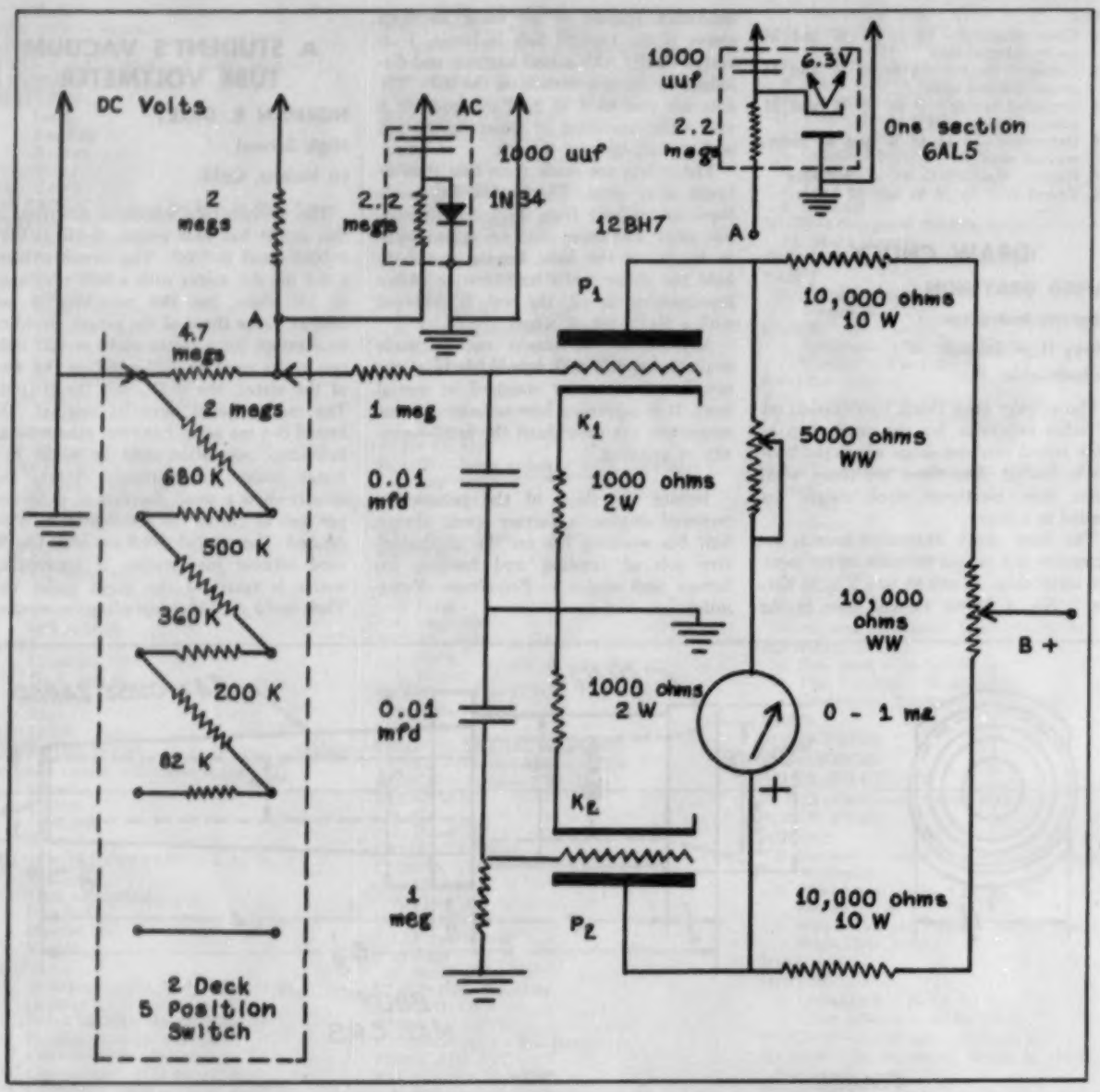


Fig. 1. A student's vacuum tube voltmeter by Norman R. Dilley

the calibration is 0–100 or 0–1.0 ma) would be 1.0 volt on the 5-volt scale and 10 volts on the 50-volt scale, etc.

The circuit used is a balanced bridge design where the input voltage applied to one tube makes the plate voltages unequal. Since the meter is connected from plate to plate, this difference in voltage is applied across the series circuit consisting of the meter and its range calibrating resistor (used to set the meter to maximum deflection for the maximum voltage of each range). The resulting current flowing operates the meter and is interpreted as applied voltage.

The input circuit is devised to allow about the same voltage to be presented to the input tube grid for each voltage range. That is, the ratio of the total voltage to the total resistance should equal the ratio of the voltage applied to the tube grid to the resistance of tube grid to ground. The tube is operated with plate current values of about 4.0–8.0 ma. Grid current does not appear to affect the linearity of calibration.

In the selection of a tube for a vacuum tube voltmeter any tube that will provide a linear increase in plate current for a given change in input grid voltage can be used. The problem, of course, arises in the attempt to find a tube that can provide such a linear increase over a sufficiently large range so that the meter with a movement like the 0–1 ma (relatively inexpensive compared to microampere meters) can be utilized. The 12BH7 tube, a television vertical amplifier tube, is suitable. It is a twin triode and so allows the bridge circuit to be constructed with a single tube. Inspection of the plate current-grid voltage curves for this tube shows remarkable linearity over a considerable range.

The vacuum tube voltmeter is about the only voltmeter that can be used by students without running a considerable risk of meter damage due to accidental overloading.

Five per cent tolerance carbon one watt

resistors are satisfactory for the input circuit values. This requires a two deck five position (or more) switch. As one switches from one range to another the ground is lifted up and attached to the bottom of the actual grid resistor. As one increases the range of voltage, one adds two new resistors in the input circuit. Any two deck switch that has five or more positions can be used – additional positions can be utilized for intermediate ranges if further experimental work is thought desirable.

Wire wound potentiometers are desirable for the zero adjustment (adjust meter to zero with leads in contact) before use. The maximum range adjustment must be set once for each range of voltage and the value of the setting noted (a pointer knob and marked dial plate will be needed on the panel for this control). These settings should be observed with all future uses of the meter. Occasional checking will be, of course, a sensible plan for the shop instructor.

Individual wire wound adjustable resistors may be provided for each scale, but this would require an additional two deck five position switch (or a single four deck five position switch). It actually is better to check for maximum deflection for maximum input voltage on each range whenever there is doubt about a reading.

The circuit is shown in Figure 1. The supply voltage required is around 200 volts plus or minus 10 volts. The total current drain is 8–12 ma. This voltage can generally be secured by utilizing one half of the high voltage winding of the usual receiver power transformer in a single wave rectifier circuit. For voltage stabilization, two VR-105 regulators (gas tubes) are needed. The miniature OB2 regulators can be used, also. It was not felt that their use was necessary for general student use of the voltmeter.

For a.c. voltage measurements a separate probe is required. A suitable circuit for a probe is shown using the 1N34 (or equivalent) diode. Mica condensers should be used in this probe circuit.

For those constructing the VTVM the table of plate and cathode voltages is supplied to allow one to check for proper voltages after the construction is completed. Remember that the cathode voltages indicate the individual plate currents in ma's for the tube in question as the cathode resistors are 1000 ohms. The plate voltages were measured by a 20,000 ohm/volt meter.

The a.c. probe circuit is best used for low voltage (about 0–30 volts) radio frequency measurements. If the major use of the VTVM on a.c. is in the audio or 60-cycle range, it would be advisable to use the alternative probe circuit shown. Then a.c. voltages up to about 100 volts can be measured and, of course, radio frequency voltages can be measured satisfactorily also. One should remember that the *a.c.* accuracy will decrease as the frequency of the applied voltage increases.

It should be noted that the filaments of the 12BH7 should be connected in parallel so that the 6.3 filament voltage can be used. The filaments are not shown on the schematic as they are certainly obvious to any, except the very beginning, constructor.

This project is best suited for the advanced radio and electronics classes as skill in working with metal and wood (where the instrument is mounted into a wooden case) is required for a satisfactory result. The voltmeter proper can be built on a 6 by 6-in. piece of aluminum (using a separate power supply) and then mounted on a sloping front wood case made of ⅜-in. plywood or mahogany paneling.

It is advisable to make a separate calibration check for the *a.c.* ranges. An individual calibrated 0–100*V* a.c. scale (made on 60 cycles) may be necessary for some instruments. For those interested in further experimental work, it can be stated that the value of the probe resistor determines the actual applied *d.c.* voltage to the grid. That is, if one decreases the series 2 megohm resistor to say, 1 megohm, then a greater voltage will be applied across the individual grid resistors. This will cause a larger difference in plate currents and a greater difference in voltage across the meter and its calibrating resistor, which would have to be increased in such a case to maintain only 1 ma for maximum deflection. This means, however, that a greater range of plate current/grid voltage relations were being used, and a greater chance for coming upon an unlinear part of that curve. This modification could be tried, however, if one were to use a 0–2 ma meter. The values of the other resistors in the input circuit have been selected to allow the same or very nearly the same voltage to be applied to the input grid on each voltage range. Changes should be made on these with caution, if a great deal of experimental work to return the ratios to equality could not be done. The only point of making changes in the schematic should be to accommodate a meter of a different movement should the 0–1 ma meter be unavailable. The series probe resistor should be changed upward for a meter movement under the 0–1 ma, and changed downward for a meter movement greater than the 0–1 ma.

As a general rule, the smaller the meter movement in current for maximum deflection, the more linear will be the calibration, and the more unlinear will the scale become the larger the meter movement becomes. The linearity for the 0–1 ma movement using the 12BH7 is excellent and no trouble should be encountered using the original calibration of the meter, provided a good quality of meter is used.

It should be kept in mind that a vacuum tube voltmeter is primarily suited for measurements where a high input impedance instrument is required. The input impedance of the instrument described here is well above 6 megohms on all ranges.

TABLE I

Range	*5 V*	*50 V*	*100 V*	*500 V*
Ep_1	122 *V*	124 *V*	124 *V*	121 *V*
Ep_2	124 *V*	127 *V*	126 *V*	123 *V*
Ek_1	7.6 *V*	7.8 *V*	7.8 *V*	7.6 *V*
Ek_2	4.6	4.7 *V*	4.7 *V*	4.6 *V*

PROJECT DESIGN FOR THE SHOP TEACHER

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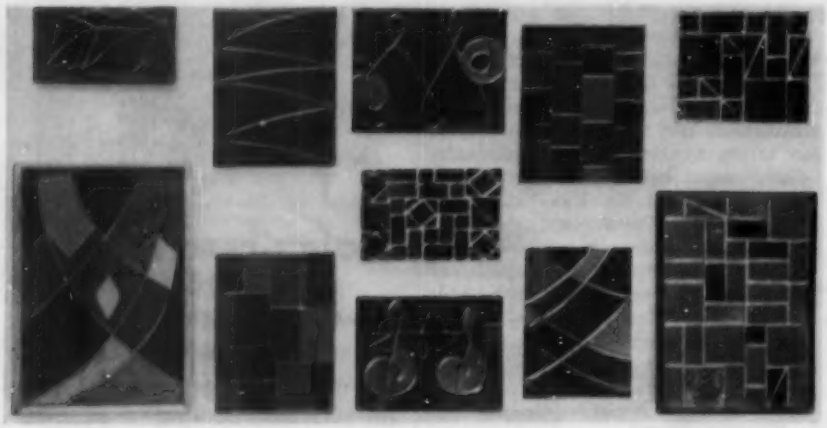
Summer Session

Design in the school shop is of little use to the community if it reaches no further than the shop project. When design concerns only the job in hand, the purpose of the lesson is overlooked. Yet, the need is there to teach the design pertaining to the project – it demands to be taught. What then can a teacher do to dispose of the dilemma? Without expending effort to design, he must set upon an otherwise beautifully executed piece of work the mark of inferiority. In the end, the work is no better than its unfortunate design.

Design is as wide as life itself, and that part which is taught in the school shop should be known to students as part of a large and sensitive picture, reaching into life itself. As a matter of fact, design existed from the very beginning of creation, causing cells and crystals to grow from their nebulous state into forms of their distinct type and family, taking on their prescribed form, even in their submicroscopic particles, as electron magnifications prove. Therefore, life is pattern and all its rhythms are describable as pattern within still larger pattern, and so on. Shop project design is an infinitesimal part of the vast idea it represents.

Not that alone, shop design should provide student contact with the world phenomenon of change from the age-old state of slavery-to-conformity, to that of freedom in the use of form and material typical of the new age. The present type of commodity design may be described as the practical product of a professional system we understand as "contemporary design." This system has a distinct category of forms and symbols derived from familiar and typical products, such as the airplane or the machine, their manner of use in design being accepted by such practitioners as industrial designers, interior designers, architects, and engineers, as the representative forms of the present age. All of these professions have contributed new forms to the group, and these as well as all others, fit an underlying philosophy, and doing so, they are acceptable automatically to those who practice in these fields. Students



Coffee pot stands, plant tiles and trays, designed and executed by seventh and eighth grade students, using plywood, brass wire, and colored polyester liquid plastic

should become familiar with this system of forms, and they may do so naturally through shop contacts.

One even more important contact with the view beyond the shop, and one that must be conveyed through project design, is that which concerns the whole pattern of outer environment. Environment is what the eye sees as far as it sees. Eighty to ninety per cent of this view is blighted, merely because schools have not supplied constructive mental patterns of that which our environments should be. Schools ordinarily give much time to teaching that which has been, but why do they not teach children what is to be? Man builds what his consciousness is, and when he is not conscious of the world he may build, he builds the chaos and confusion which is the general mental state.

The school shop, being a logical department where constructive environmental patterns may be built, sets its stake in footstools, etc., a policy that results in an immeasurable loss to the age. Trivial projects, and more of them by far than are necessary in any case, are costly when seen in this light. School shops should begin their work in environments, and then, subsequent projects become part of the large picture, in which situation, it would not need a scientist to see, the project would be infinitely more vital. The results obtained in shops through this program are amazing.

Mention was made above of a phenomenon of change whose symbols are known as "contemporary design" setting the age free to use the materials of this new scientific era. The use of new materials, many of which are still in the laboratory stage, is thus no longer under the onerous web of restriction typical of the fears and compulsions of tradition. Plastics are one of the most important of these materials, and it is a wonder why more schools do not fit their courses to the pulse of the age through their use. It is necessary for shops to do this to help the present economy. Our new materials must find markets. The income of many thousands depends on the steady growth of markets and on the use of our new industrial products.

Wherever man goes, *he designs*, good or indifferent. When he throws paper on the velvet green of a public park, he designs. His environment becomes no better than his mental picture. An ugly environment is, in the end, the result of his education, and it is the outer pattern of his inner consciousness. Eventually, he gathers to himself forms and things congenial to his concept and feeling. If his surroundings jar his developed sensitiveness to the greater freedom of cleanliness and order, he moves to the suburbs, or he puts his shoulder to the task of saving the civic ideal in his area. He then becomes a dynamic force for construction. For these reasons, the shop must some day recognize its duty to the nation, for it holds in its hands the power to change environments; and if it fails, our cities will slowly waste and die.

Thus teachers may give students, not project design as such, but the contacts and constructive mental patterns for living. If the teacher disregards or makes little of contemporary design such as is set forth here, what has the student to build his future on? "Tomorrow" is his "Today." Contemporary design is essential to him. The schools cannot say, "I do not like it"; the world cares little what one individual likes: the duty of the school shop is to teach the facts of today, and none will deny that contemporary design is inseparable from today.

Unfortunately, shop teachers are ill prepared to understand the design picture as it is known professionally. Of all their teaching, that of design is the most impractical and negative. The relationship between design and other elements of project production is not comparable to that in industrial production, where the most recent design is essential to the whole effort. The negative and nonprofessional attitude toward design in school shops leads to mental confusion in school shops and to eventual chaos in the larger creative expressions. Finally it blights the surroundings of those who had no clear picture.

The basic trouble may be traced to a long-time underrating of the subject of design by leadership in the industrial-arts department, a direct outcome of which is teacher confusion in that area. Teacher education colleges, following the pattern of leadership, have for the most part slighted the subject, giving it a minor place, and assigning its teaching to staff members ill prepared for their task, even though they conscientiously informed themselves on the subject and taught as best they could from books. There are few, if any, professional designers on industrial-arts department teacher education college staffs. Industry, which values design more, assigns its problems to the topmost industrial designers of the nation. They have the clear professional view and perspective.

Is is far from the intent of this article to underrate our excellent teachers, but it is high time that an effort is made to train industrial-arts design authorities on a basis comparable to that which trains industrial designers, giving them the most needed professional viewpoint. The teacher training schools would do well to investigate the highly regarded industrial design courses offered by Pratt Institute, and it would be well for schools who contemplate an improvement in their design offering to consult with top industrial design authorities, to avoid wasting money and time on a less than professional setup.

There is a strange fear in the hearts of many school-shop teachers when the problem of design confronts them. Their eyes betray an unsteadiness as if they were about to take off in a space rocket and never return. A blueprint, yes. It pictures a tangible thing: but design "is beyond me." This of course is not true: the fear is from lack of training. Many of us would be in a like place were we before an audience trying to speak on fissionable atoms. Training would solve the problem.

Knowing design as the professional knows it is not the colossal task most shop teachers picture it to be. An ancient process of knowing people and a more recent one of knowing machinery or cars, is to associate with them. We all know how basic this process is. It needs no tricky formula, just contact, and enough of it: the learning comes naturally. There is danger of course in choosing the subject of contact: contact with mediocrity reproduces some of that quality in the one who chooses such an association, while contact with professional authority transfers the quality of sureness of knowing. "What your attention is on, you become." Thus the simplest route to knowing design is to contact professional reporting in top journals of that area, and apply disci-

plined, organized, and continued attention to it.

Design sources, necessarily should be of the highest quality, and it would be desirable were school shop supervision to furnish its teachers with a limited number of the best professional magazines on design.

From all that has been said, it should not be inferred that a design course as such is part of the industrial-arts program. A shop teacher has no time for the formal teaching of design. But he teaches design nevertheless, by his every word, by his enthusiasm, encouragement, direction, and suggestion. He should lay the foundation in his first introduction, and thereafter, he builds his pattern, surely if he is sure of his subject, and clearly if he himself is clear. He also teaches by means of right contacts, using illustrations, models, and sketches; knowing that repeated association of the student with right material is sure teaching.

The critical point in the plan here offered is the initial presentation. Broad views must be expressed during this short but well-prepared and well-supported lesson, all subsequent design work and reference hinges on the pictures thus built. This plan might well be followed in the school shops of the nation.

The initial presentation may be roughly described as follows:

1. The key exhibit and support of the talk is a group of three large sketches. These are as rough or as finished as ability allows: a boy will understand even a bare skeleton sketch. A teacher, sold on the idea, will not say, "I cannot sketch"; he will *sketch*, and bury his pride. None will blame him if he is not a Michelangelo. The roughest published sketching imaginable is to be found in Rudyard Kipling's "Just So Stories" for children. I have never seen anything but delight in those who examined these scratchy, scribbled illustrations. All a child needs is an outline: they build the remainder out of their mental paradise, but they need the cue, and they need it large.

2. Subjects of sketches:

a) "We could build a magnificent America," a sketch depicting a re-designed business street, patterned after the latest professional trend in which the many separate business places are replaced by a single large, clean, and uncluttered contemporary building of glass and steel, reaching for three city blocks as a single unit. (See the illustration, third on page 321, October, 1950, issue of this magazine.)

b) "We could just as easily design beautiful residential environments," a sketch of a new area for living where the contemporary houses are faced with kitchen and garage to the street, large living room to the park, and in the place of the usual alley and driveway clutter, a large pool and play area set within a shady park. (See the second illustration, on page 321, October, 1950, issue of this magazine.)

c) "We could screen every unsightly civic activity," a sketch of a screened filling station and auto yard, or of a coal and material yard, whose business is done behind a glass wall and shrubbery, or hidden in a bank of trees and bushes. (See first illustration on the page given above.)

3. The talk would simply state:

a) Pilgrims came to an unspoiled virgin land. This was our heritage.

b) Man cut down its forests, defaced its beautiful valleys, and spoiled the greater part of everything he touched. Today, our cities and highways are unsightly evidence of his disregard for their original magnificence.

c) We are free to build into our environment its reasonable dignity and order. We could build a magnificent area around us, and we, together with many others, could build an incomparable America.

d) We could redesign our (specific) business street according to the best of the contemporary trend, removing all its present ugliness, and giving it the open glass cleanness and unity of construction, combined with the strength and assurance which its far extending dimension conveys, draw to the area such greatly increased numbers of shoppers as to insure the project against any doubt of its economy.

e) We could do this in our home areas. Here, children do not play on streets. Life is more reasonable and living is closer to nature.

f) Business stands need not blight our city areas if they conform to a prescribed civic design. All unsightly business should be screened, not to break the continuity of reasonable pattern. This is imperative, if environment is to be reconstructed.

This is the picture of design all students have a right to view and to build, before they design projects; and thereafter, it is easy to conceive that all work is an extension and a clarification of the mental pictures vividly in mind of the new environments in America.

As was stated before, today, students are free to design their projects and their environments in new ways and with new materials because they are not bound in slavery to the past, as was our generation, and they are not unwilling to be loyal to our industries which provide the excellent new products that symbolize more than any other, the present and coming age. These need marketing and use to support them.

The illustration shows student-designed and executed small projects such as coffeepot stands, flowerpot tiles, trays, etc., cast on plywood bases, using one of the newest and typical of industry's new materials. There is in the writer's intent no desire to merely promote a favored material, but plastics is a material that in the judgment of seasoned teachers who have teaching at heart, meets all the needs of both the student, the school, and the times, and though enough has been said in previous articles in this series of its worth, there is still the temptation to say, it will satisfy anyone sold on introducing into his school shop these economical, simple-to-use, and typical teaching media. Never in our experience have we had a more thoroughly teachable and enjoyed project. Some of the tiles shown are cut out of masonite, colored in three related hues with liquid plastic, and then arranged and cemented to the plywood board. Others are cast directly on the base plywood into spaces made by laying polished brass wires over the wood. Colors in the liquid resins thus poured are also in three related hues.

As explained in the article of last month, these simple tiles are as desirable for the teaching of beginning design as any medium that may be found. These, following the introduction, give students the total of at least a minimum of design contacts which he should have in the school shop.

Then follow the pasting of a carefully selected group of illustrations of contemporary tables, interiors, shopping centers, ceramics, silver work, etc., which, together with an occasional chart, some models perhaps, and some explanatory sketches, give the student contacts which build the mental patterns he should have and the understandings of design he should derive from his schooling with which he will raise his environment to high levels of order and maturity.

SIMPLE TENONING JIG

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Student
Iowa State College
Ames, Iowa

In order to receive the full value from a circular saw one must be able to perform varied operations with it. One such operation is the cutting of tenons for mortise-and-tenon joints. To do this with uniform accuracy and safety, a jig may be used. Here is a tenoning jig which can be built by the shop teacher or student in a short time with a minimum of expense. The jig can be used with a high degree of accuracy.

Also needed with the jig is a hand screw clamp. The one recommended here has jaws of 1¾ by 2 by 10 in., with 3⅛ in. between screw centers. Smaller or larger clamps can be used but corresponding changes in linear dimensions have to be made on the jig. The size shown here will be sufficient for most shop tenoning work.

Materials of construction for the jig are few. The type of wood used should withstand considerable wear. Scrap wood can be used but should have straight grain running parallel with the saw table. Stock ¾ in. thick will be sufficient. All parts can be obtained from a board 8 by 32 in. Other

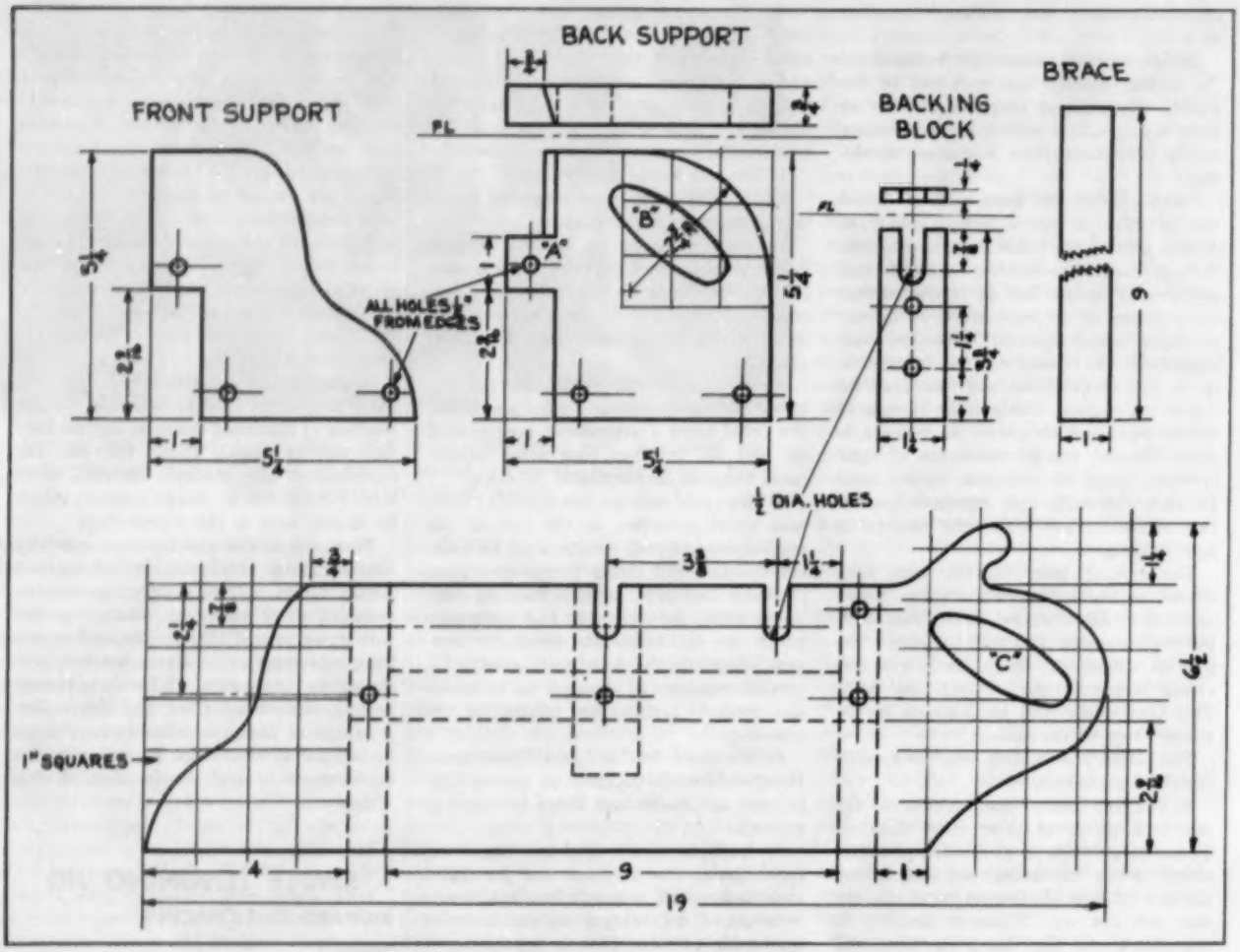


Fig. 1. Details of the simple tenoning jig

supplies needed are flathead wood screws and glue for the butt joints.

Prior to the making of the jig, it is essential to secure the width and height of the saw fence as well as the size of the hand screw. Otherwise the jig will not fit the saw for which it is intended.

BILL OF MATERIAL

Quantity	*Part*	*Size*
1	Sliding fence	¾ x 6½ x 19
1	Front support	¾ x 5¼ x 5¼
1	Back support	¾ x 5¼ x 5¼
3	Braces	¾ x 1 x 9
1	Backing block	¾ x 1¼ x 3¼
10	Flat head screws	½ No. 8
2	Flat head screws	⅞ No. 8
	Glue for joints	

Fig. 2. The assembled tenoning jig

Procedure

1. Obtain stock and run both edges over the jointer for squareness and smoothness.
2. Lay out parts directly on the board. Have the sliding surfaces along the edge of the board.
3. Check the following: Keep the left handle hold above the fence to protect fingers. Keep part *A* on back support as wide as possible for added strength. Be sure to have the correct distance between the supports to accommodate the right clamp jaw.
4. Use a band or a jig saw to cut out the parts.
5. Drill holes B and C, and saw out handles with the jig saw.
6. Drill two ½-in. holes for clamp screws, notch out the remainder with a saw.
7. Rip three braces from the board, and cut them to equal lengths.
8. Cut backing block to size and drill hole for clamp screw.
9. Be sure to sand rough curves and edges, especially around the handles.
10. Mark angular cut on top of back support and cut to size. Allow clearance for clamp.
11. Preassemble the parts over the saw fence, make corrections and alterations as may be necessary.
12. Mark position to screw the holes, and drill 3 in each support and 4 in the sliding fence.
13. Countersink holes for screw heads.

Fig. 3. The tenoning jig in use

14. Assemble, adding glue to joints for added strength. Follow this order: (*a*) front support to sliding fence; (*b*) brace above fence to front support and sliding fence; (*c*) brace along side of fence to front support; (*d*) outside brace to front support; (*e*) back support to three braces then onto sliding fence.

15. Sand supports if too tight against fence. Jig should slide over saw fence with ease and no vibration.

16. Place backing block next to forward notch on outside of sliding fence. Hold in place with hand clamp. Square block with try square in reference to saw table.

17. Drill pilot holes and fasten with two ⅞-in. screws.

18. Finish sanding.

19. Apply protective finish.

When operating, stand to right of saw and use both hands to push and guide the jig. Put the left hand on the sliding fence, and the right hand on the back support as shown in the picture.

FROZEN FOOD FUNNEL

ALFRED GRAYSHON

Olney High School

Philadelphia, Pa.

More and more fresh vegetables, fruits, and meats are being quick frozen to store in rented lockers of local freeze plants or home deep-freeze chests. It provides a modern method of having available fresh foods for all year consumption that was unthinkable even in the near past. It is more simple to pack foods this way for future use than the canning process that required hours of work over a hot stove. The vegetables and fruits are best if quick frozen when they are fresh picked to retain their natural flavor and tenderness.

The project here illustrated is a handy accessory, rectangular shaped funnel, made of tin plate to aid in filling many types plastic or pasteboard containers.

Materials: *2* pieces XXX tin — *2* by 4⅜ in. *2* pieces XXX tin — 4⅜ by 5 in.

Procedure

Sides:

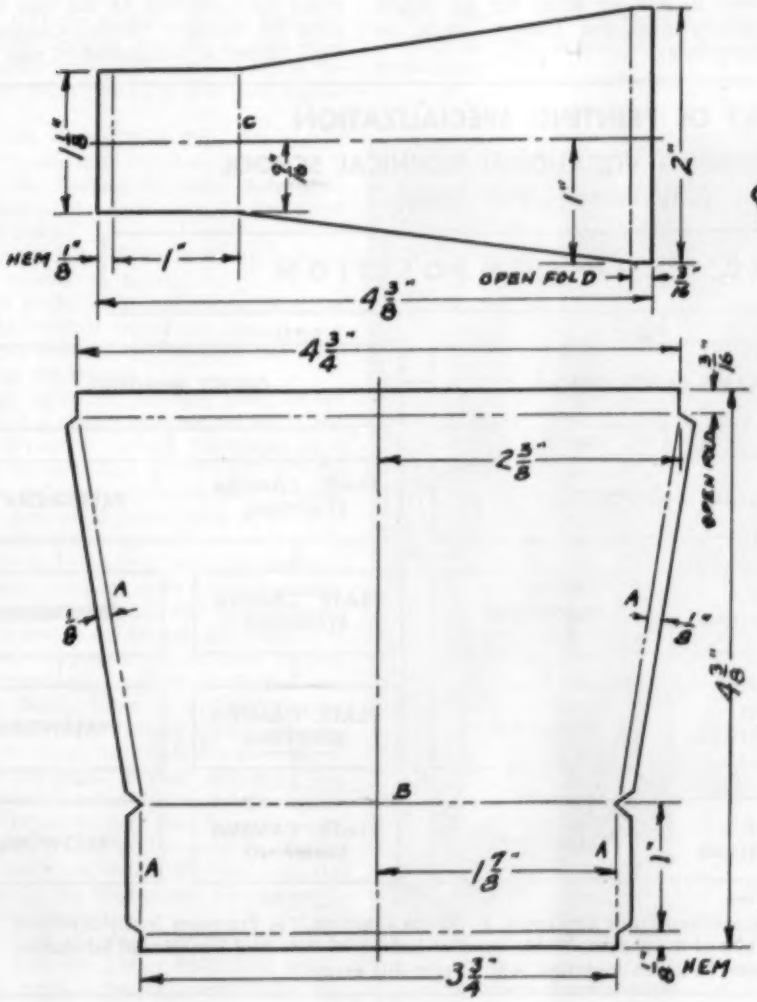
1. Cut pieces.
2. Lay out.
3. Cut to layout and notch.
4. Bend open fold.
5. Bend the single hemmed edge.
6. Bend the right angle edges on lines A.
7. Make a slight bend on line B.

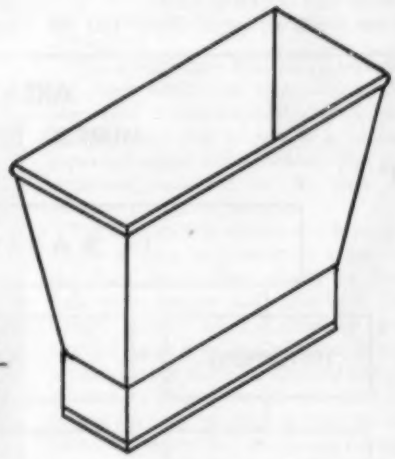
Ends:

1. Cut the pieces.
2. Lay out.
3. Cut to layout.
4. Bend the open fold.
5. Bend the single hem.
6. Make a slight bend on line C.

Assembly:

1. Fit and solder one endpiece to each edge of one side piece.
2. Solder remaining sidepiece to the endpieces.
3. Cut a piece of No. 14 copper coated wire 12½ in. long.
4. Bend this wire to fit open fold of





FROZEN FOOD FUNNEL

Details of the frozen food funnel

This is a handy accessory to aid in filling many types of plastic or pasteboard containers

assembly so that the ends meet in the central part of one side.
5. Close fold gradually over the wire with pliers and hammer.
6. Polish with whiting.

PHOTOGRAPHY AT TUCSON HIGH SCHOOL

HERMAN BERLOWE
Tucson, Ariz.

On October 8 last, Bruce Cole, president of the Tucson Camera Club, stood before a banquet gathering in Boston, and accepted for an absent friend an award unique in the annals of the Photographic Society of America.

Cole explained that he was "proud and happy" to take back to Tucson, Ariz., the certificate which stated that Harry Goldstein, a photography teacher at Tucson high school, had been elected an Associate of the Society.

Cole had reason to be proud. And so has Tucson. In winning this national recognition, the 42-year-old Goldstein became the only high school teacher in the United States ever to receive this award for teaching in the field of photography.

It was weeks before, of course, that the Tucsonian had been informed he was to be thus honored. He was nearly speechless when he read the letter. But the Society scarcely gave him time to regain his composure.

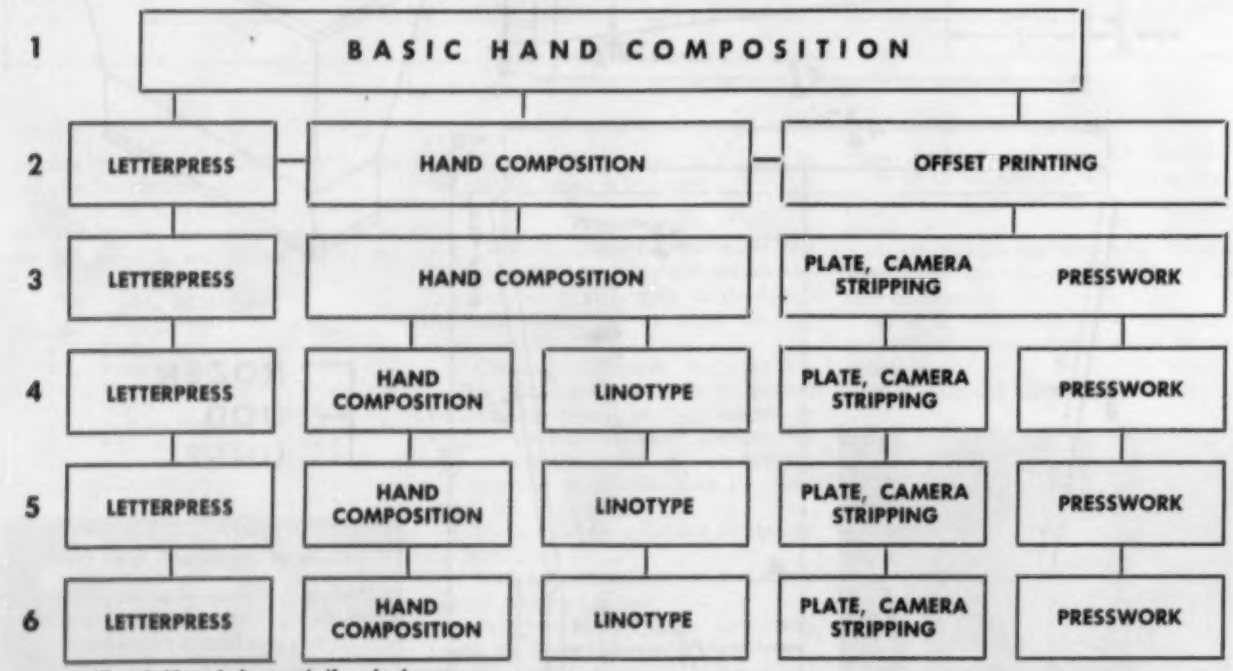
Photography Class at Tucson High School
Left to right: Bill Navarro and Douglas Lindsay, students; Harry A. Goldstein; and Rene Gauna, student
— Photography by Al Billings, graphic-arts department, Senior High School

For in the mails, only days later, came a second letter. It informed the trembling young instructor that he was also being given the Society's "Service Commendation," offered in "recognition of your out-

AREAS OF PRINTING SPECIALIZATION

MURRELL DOBBINS VOCATIONAL-TECHNICAL SCHOOL

(Day School — Unit Trade)



*Term is 20 weeks long, or half a school year.

The above table was unfortunately omitted from Benjamin J. Novak's article, "A Program in Lithographic Printing" which appeared on page 116 of the March, 1956, issue of **Industrial Arts and Vocational Education.** We hope that this insertion will correct this error.

standing service in the encouragement of photography among high school students, in the promotion of photographic activities among teen-age workers, and for your services in the furtherance of the Society's principles and ideals among educators throughout the nation."

Behind this double-barreled accolade lies a typical American success story, the story of a New Jersey newsboy, who, as an 11-year-old, conducted a highly successful photo finishing business, who was graduated from a vocational school at 15, obtained a full-time job, entered an academic high school at 18, was graduated three years later — and then, harried by illness, headed for Arizona, where years later, years marked by additional adversity, he won his hard-earned bachelor's and master's degrees.

All this, of course, would be an adequate tribute to the character and perseverance of Harry Goldstein.

But a finer and more appropriate one would be the superlative teaching job that he and other photography teachers at Tucson high are doing — a job so thorough, so classic it is perhaps unequaled in any American photographic classroom.

In 1955, for example, Tucson high photography students won more prizes than any other single high school group in the nation. What's more, it was their biggest year.

At the Arizona State Fair, they walked off with almost all the photo awards.

In the National Scholastic Association competition for Arizona, they captured all photo honors.

Entered in the Eastman Kodak contests, they received six prizes.

And in the photo competition sponsored by the Freedom Foundation, these Tucson students were the only scholastic lens snappers to win rewards.

This, of course, has been going on for years to a greater or lesser degree. In the past decade or so, the Tucsonians have rung up something like $14,000 in cash prizes and scholarships and many of them have gone on to greater fame in the photographic field.

This has been true not only nationally but also in a local sense. Goldstein points with pride to the fact that approximately 50 per cent of the photography workers in Tucson, a booming city of some 175,000 population, are graduates of Tucson high photo classes. There are now 140 students in advanced photography classes, whereas four years ago there were less than 20.

All this began 15 years ago, when Otis Chidester, popular, farseeing head of the present Graphic Arts Department — printing and photography — came to Tucson high. Goldstein credits Chidester with the success of the program and the pinnacle it has now reached.

By 1942, when Goldstein came to Tucson high, there was a start, small as it was — a few tanks, a few enlargers. Today, the equipment in use is said to be the finest to be found in any American high school, better, some claim, than seen in many colleges. And on the walls hang examples of the work turned out by these embryonic professionals. The originality and composition is startling, considering that the photos were made by 16- and 17-year-olds.

How does this come about? Well, it can begin in the student's freshman year, when the aspiring photographer gets 60 hours of photography — together with 60 hours of printing, plus 60 hours of related work such as lectures, field trips, etc. In the second year, students enter advanced photography, devoting one or two hours a day to the subject. After advanced photography, comes practical work on the school publications, and by the time the final year is wound up, a student has, what Goldstein terms, a "good basic background" and can qualify in almost any branch of the photographic field.

Does it take any special aptitude to become a photographic graduate of Tucson high's darkrooms?

The man who learned his trade at an age when most youngsters are perusing comics says that it does not.

"If a child has drive and wants to learn," contends Harry Goldstein, "he can succeed in our classes."

He explains, too, that photography is taught on "three levels" at Tucson high: (1) for those who want it as a future vocation; (2) for those who take it as a trade subject; and (3) for those who learn it as a hobby.

"The successful student photographer falls into certain patterns," Goldstein asserts. "He dislikes to read and is a poor reader. But as soon as he comes into photography, he finds himself."

Which is true also of the girls. Strangely enough, 50 per cent of the photography students are girls. The boys may show more originality, but the girls excel in the lab!

Modern candleholder

MODERN CANDLEHOLDER

FRED C. ROGAN
Industrial Education Department
University of Maryland
College Park, Md.

The attractive styling and design of this candleholder is in keeping with modern living. The *ski jump* effect tends to lend itself toward a winter setting, or as the eye catching portion of a mantel or buffet centerpiece.

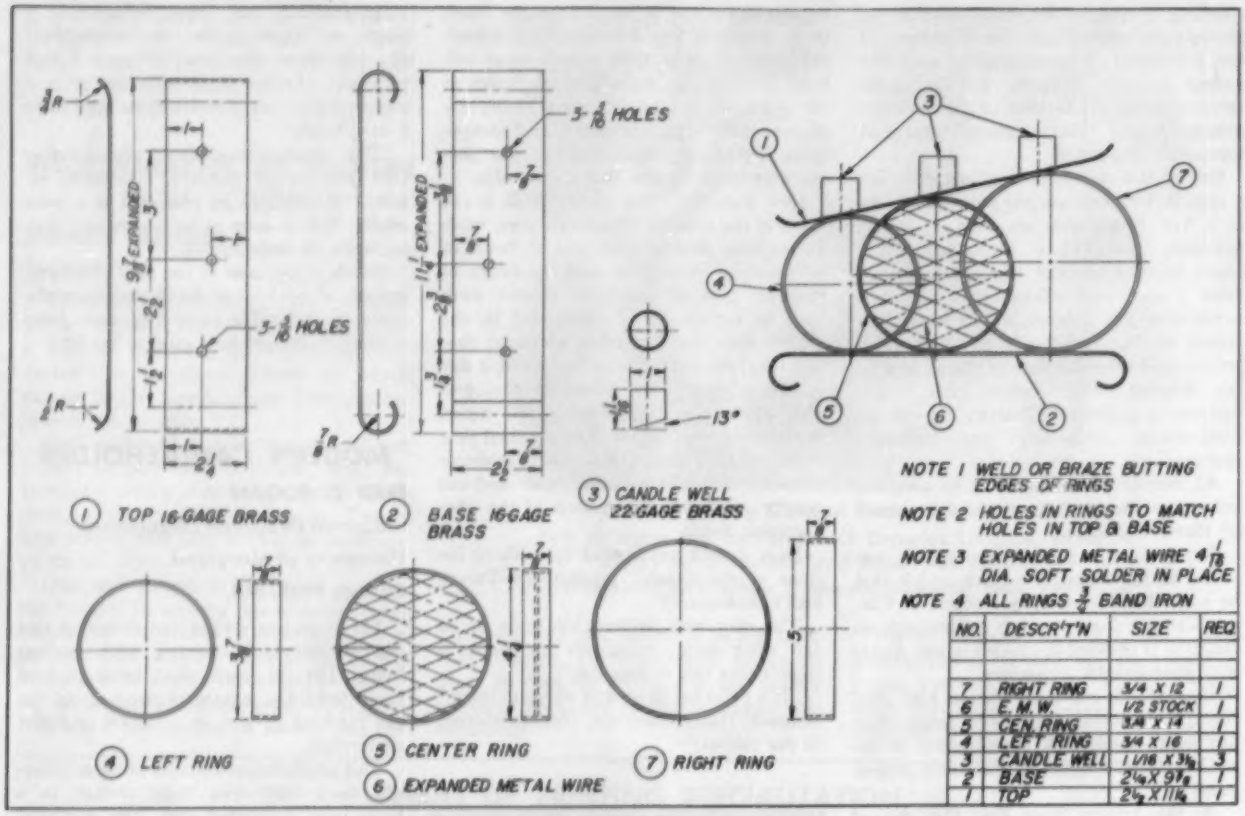
This candleholder consists of three different sized band iron rings riveted to a brass base. Expanded steel sheet is placed in the center ring to give it a feeling of depth and added attractiveness. The candle wells are positioned on top brass strip, which is riveted to the rings.

The construction of this unit is relatively simple if done in a series of steps. First, the three center rings should be formed from three quarter inch band iron. Forming can be accomplished either by using a bending jig or a mallet and stake. A simple pattern can be made by drawing the three circles on a piece of wood with chalk, then placing the rings on them as they are being formed to assure that the proper contour is being developed. After forming, the ends should be welded or brazed together and all rough spots removed by filing.

The brass base and tops are the next logical parts to be constructed. After the top and base have been cut out of the 16 gauge brass sheet, a mallet and stake are all that is required to form the rounded ends. All edges should be filed smooth in order to prevent cuts in handling.

Attaching the base and top to the center rings is done by riveting the rings to first the base and then the top. Countersunk rivets should be used and all visible rivets should be filed smooth with the surface.

The next step will appear to be the most difficult to achieve; the construction of the candle wells. Although the slope of the candleholder presents a problem in layout of the wells, all three can be made rather simply in the following manner. Twenty-two gauge brass, in sufficient width to ac-


3-3/16 HOLES
3-3/16 HOLES
13°
1 TOP 16-GAGE BRASS
2 BASE 16-GAGE BRASS
3 CANDLE WELL 22-GAGE BRASS
4 LEFT RING
5 CENTER RING
6 EXPANDED METAL WIRE
7 RIGHT RING
NOTE 1 WELD OR BRAZE BUTTING EDGES OF RINGS
NOTE 2 HOLES IN RINGS TO MATCH HOLES IN TOP & BASE
NOTE 3 EXPANDED METAL WIRE 4 1/8 DIA. SOFT SOLDER IN PLACE
NOTE 4 ALL RINGS 3/4 BAND IRON

NO.	DESCR'T'N	SIZE	REQ.
7	RIGHT RING	3/4 X 12	1
6	E. M. W.	1/2 STOCK	1
5	CEN. RING	3/4 X 14	1
4	LEFT RING	3/4 X 16	1
3	CANDLE WELL	1 1/16 X 3 1/8	3
2	BASE	2 1/4 X 9 7/8	1
1	TOP	2 1/2 X 11 1/4	1

Detail drawing of the modern candleholder

commodate all three wells, should be rolled into a tube with a 1-inch diameter. The butting edges should be silver soldered to achieve a permanent joint. If available, 1-inch thin-walled brass tubing may be used. Insert a 1-inch dowel into the tube and cut off the wells at the proper angles. Cut through both the brass and the dowel. The wells are wired in places to facilitate soft soldering the candle wells to the top.

The final step before finishing is the cutting and positioning of the ½-inch expanded steel sheet. The use of expanded steel sheet gives the candleholder that added *modern look* which is so prevalent in present-day furniture styles.

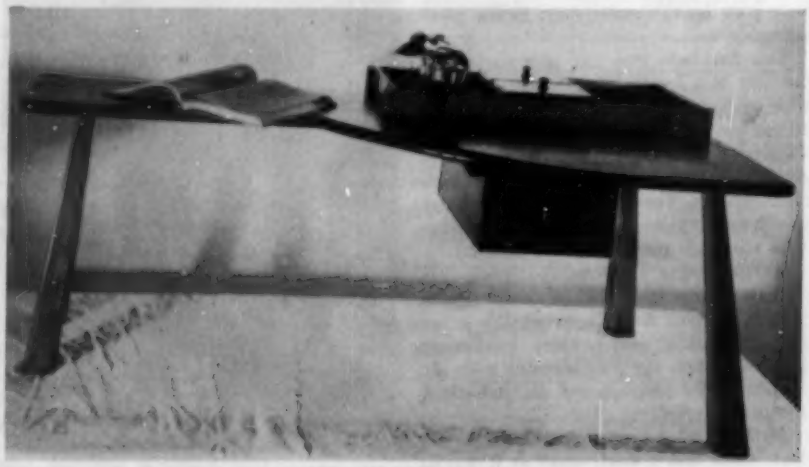
All parts, except the brass, are finished with a dull black metal lacquer. The base, top, and wells should be polished to a bright luster. Clear lacquer should be sprayed on to the finished product to protect the bright finish and render further polishing unnecessary.

Processes involved in the construction of this unit include: drilling, riveting, soft soldering, silver soldering, forming, welding or brazing, layout and finishing. The many operations involved in this candleholder make this a good project for a class in general metals. The material cost, always a leading factor in project selection, is much less than other projects of equal teaching and learning value.

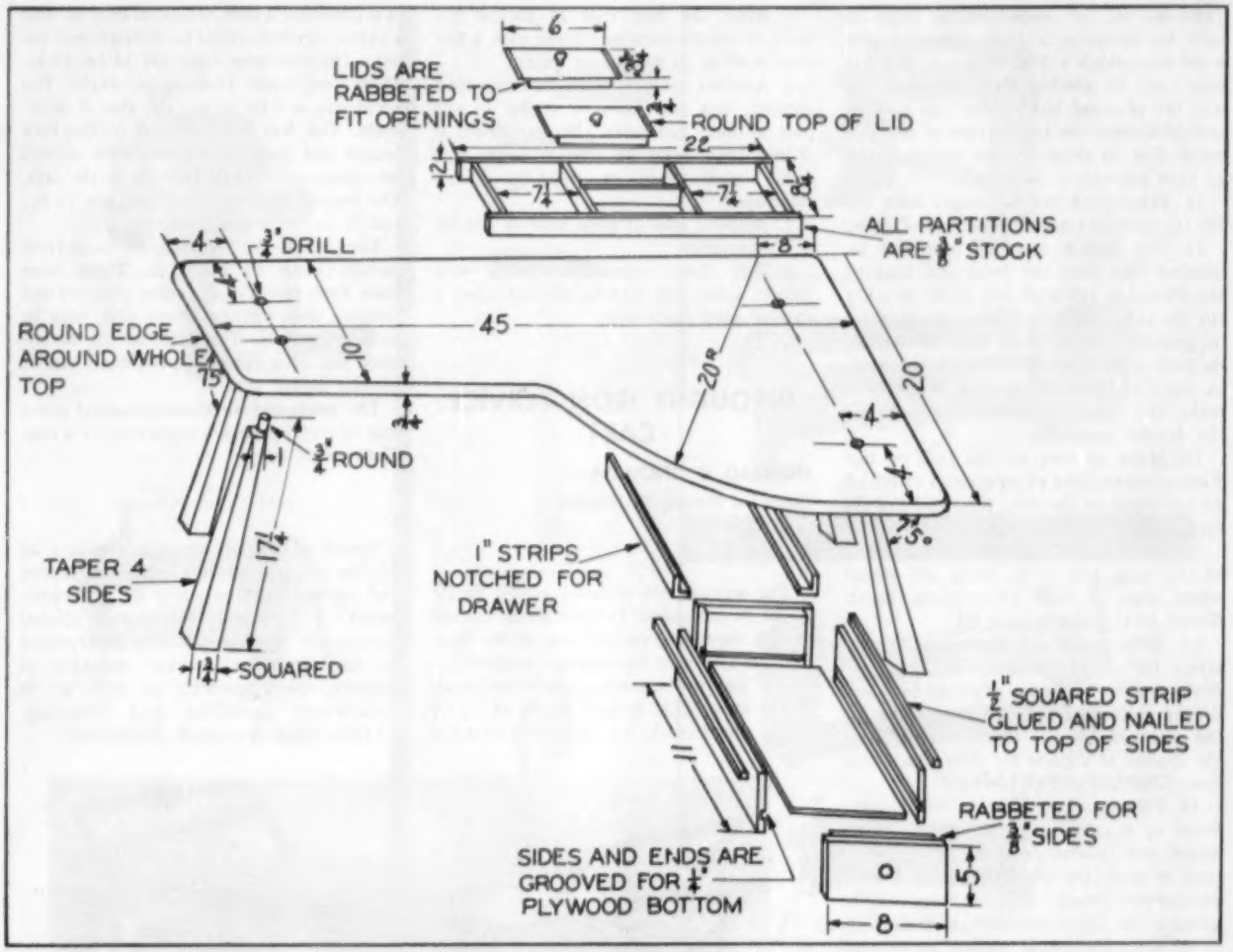
A COBBLER'S BENCH

CALVIN T. STOTT
Woodshop Instructor
Eichelberger Senior High School
Hanover, Pa.

One doesn't have to be a lover of antiques or have a whole room full of them in order to make and enjoy having a cobbler's bench, like the one described herewith, around the house. Its simple design lends itself well to nearly every type of interior decor and its functional ability has in many cases replaced the standard coffee table. Also, the worn Early American design of the bench will add a note of warmth and beauty to almost any room, and of course, its simple construction makes it possible for nearly anyone, even those with very little skill and no woodworking machines at their disposal, to build one.



The cobbler's bench


LIDS ARE RABBETED TO FIT OPENINGS
ROUND TOP OF LID
ALL PARTITIONS ARE ⅜" STOCK
¾" DRILL
ROUND EDGE AROUND WHOLE TOP
¾" ROUND
TAPER 4 SIDES
1" STRIPS NOTCHED FOR DRAWER
SQUARED
½" SQUARED STRIP GLUED AND NAILED TO TOP OF SIDES
RABBETED FOR ⅜" SIDES
SIDES AND ENDS ARE GROOVED FOR ¼" PLYWOOD BOTTOM

Details of the cobbler's bench

Selecting the Stock

For most reproductions, the old craftsmen buy old used lumber which has been dried and colored with age. However, for our use and purpose, nearly any type of good dried stock will do. White pine, cherry, maple, walnut, or poplar, if the green streaks are bleached out, are all ideal woods for this particular project. Remember, however, that only pine, maple, or poplar will give a finished honey-colored or mellow look. The other woods like walnut and cherry should be finished off natural, and thus their colors are quite different in contrast. Although a few knots are permissible, since these will add to the beauty of the project, make sure that there are no loose ones which will cause future trouble. The top of the bench can be made of ¾-in. stock, as shown in the drawing; however, a 1-in. thickness gives more stability and makes a much finer top with less chance for future warpage. The legs should be made from 2-in. stock, but don't be discouraged if ¾-in. stock is all that is available. The bench described herein was made of ¾-in. white pine stock and a series of three pieces of ¾-in. stock glued together make up each individual leg on the bench.

Procedure

1. After selecting the stock, it is then ready for cutting to the approximate size. Allow about ½ in. over on all dimensions. Stock for the top and for the legs, if solid stock is not available, is glued.

2. After the glue has been allowed to dry, the top is then squared to 20 by 45 in. This can be done by using hand tools or by cutting on the circular saw.

3. Lay off the top as shown in the drawing by using trammel points. It can then be cut out with a handsaw or on the band saw.

4. File and smooth out the irregular curve just cut and sand both surfaces.

5. Round off all edges on the top by using a shaper or router or a hand plane. Sand the rounded surface smooth to give a worn effect.

6. Square the legs to 1¾ by 1¾ by 17¼ in.

7. Lay off the taper on all legs, as noted in the drawing, and saw or plane off the surplus. This can also be done on the jointer if one is available. After the legs have been tapered, make the ¾-in. round socket at the small tapered end. Use the bevel gauge set at 75 deg., to angle off lower part of the socket.

8. Round edges on all legs with a block plane and sandpaper.

9. Locate and drill the ¾-in. holes in the top. Use a brace and bit and keep the bevel gauge set at 15 deg. to check slant both ways as drilling progresses.

10. Cut saw slots in the dowel part of each leg. This is for the purpose of making a spline joint in each leg later on.

11. Apply glue liberally on each leg and with a mallet drive them into their respective holes in the top. Make sure bevel on leg coincides with the angle of the leg. Saw small wedges of stock out on the saw, apply glue liberally to these and drive each wedge tight into the saw cut of each leg. Check each leg with the bevel gauge after it has just been glued to assure its proper angle. Leave glue dry overnight.

12. Smooth the surplus of each leg off flush with the top surface of the bench.

Then lay off the proper setting angle of each leg by using a ¼-in. piece of plywood into which a 3-in. diameter hole has been cut. By placing each individual leg into the plywood hole, a line can now be scribed around the top surface of the plywood. Cut off these bottom setting angles of each leg with a handsaw.

13. Plane stock for the drawer sides and for the rack on top to a thickness of ⅜ in.

14. The drawer is made next and remember that both the front and back of the drawer is rabbeted out ⅜ in. to allow for the sides. Also remember to cut a ¼-in. groove about ½ in. up from the bottom on both sides and both ends so that a ¼-in. piece of plywood can slide in freely to make the drawer bottom. Glue and nail the drawer together.

15. Make all cuts for the rack on top. Remember to dado all joints and round off all top edges on the rack. Glue and nail the rack together.

16. Make and fit the two lids for on top of the rack. Use ¾-in. stock and rabbet whole edge on each lid to ⅜-in. depth. Round off top edge of each lid.

17. Make strips for drawer guides and strips for drawer hangers. Fit and nail drawer guides to the top edges on each side of the drawer. Fit the drawer slides on the underside of the bench top by using the drawer as a guide for their exact location. Glue and nail all pieces.

18. Fill up all nail holes with plastic wood or a composition of ducco cement mixed with sawdust from the type of wood used to make the bench. By using a small rectangular punch, all nail holes can be given a cut nail appearance, if desired.

19. Give the whole project an over-all sanding with 4/0 and then 6/0 garnet paper. The job is then ready for finishing.

Applying the Finish

1. A good commercial oilstain of knotty pine or antique pine can now be purchased at most hardware or paint stores. Usually, however, this stain is much too deep as it comes from the can. Reduce it, therefore, by mixing one part of stain with two parts of turpentine. This will make a good finish for woods like pine, poplar, and maple.

2. By diluting one part of orange shellac to two parts white shellac, and then cutting the whole mixture with an equal amount of alcohol, a very beautiful honey-colored finish can be obtained on the lighter woods instead of using the stain described in paragraph one. Remember, however, to apply this mixture of shellac quickly, since brush overlaps are likely to show.

3. The walnut, cherry, and other darker woods should be finished natural by using white shellac diluted with an equal amount of denatured alcohol.

4. After staining the project with the oil stain, the same mixture of white shellac and alcohol, as used in step three, should be applied.

5. After the first coat of shellac has dried, it should then be rubbed with a fine steel wool or an 8/0 garnet paper.

6. Another coat of white shellac is then applied. Mix two parts of shellac to one part alcohol, and when this has dried, it should once again be rubbed down with either steel wool or finishing garnet sandpaper.

7. Apply a coat of good varnish and let dry thoroughly.

8. Rub down varnished surface with pumice stone and rubbing oil and apply a coat of good paste wax.

WROUGHT IRON SERVICE CART

DONALD C. INGRAM
General Metals Instructor
High School
Austin, Minn.

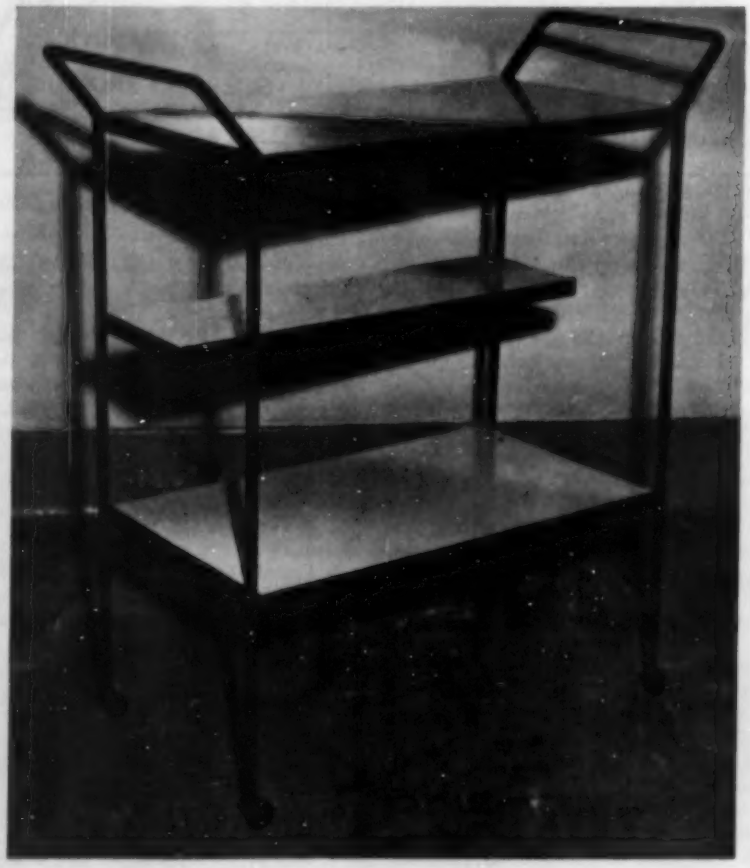
The serving cart pictured in this article might be the answer to some areas and age groups depending on the size of the class and the ability of the students involved.

The legs can be made a number of ways. These were made from 4 pieces of ½ by 28-in. round stock. The legs were chucked in a lathe and a hole drilled in each so that a caster assembly could be inserted into the hole. The two large trays are 14 by 24 in. They were made from ¾-in. angle. The small tray is 7 by 24 in., and also of ¾-in. angle. The legs were welded to the tray frames and then the handles were welded into place after being bent to fit the legs. The bottom tray and small tray are 11 in., and 21 in., from the floor.

The tops of the trays can be made from various kinds of materials. These were made from pieces of discarded plywood and formica that was cut from sink tops in kitchen cabinets. They can be cut to finished size on a variable speed band saw or circular power saw.

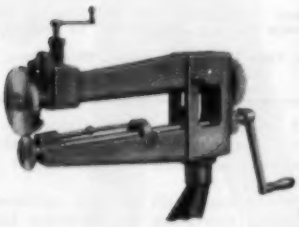
The welds and metal were cleaned and a coat of metal primer was covered by a coat of flat black paint.

Speed of sound through the sea at depths as great as 300 feet is measured and plotted automatically by a "velocimeter," developed by the National Bureau of Standards. The instrument is expected to prove valuable in oceanography research as well as in underwater signalling and detecting. — *Industrial Research Newsletter.*

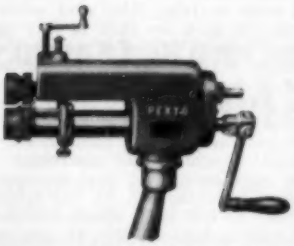


The wrought iron service cart

Combination Rotary Machine



Double Seaming Machine



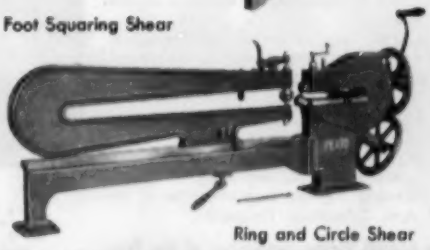
Furnace Collar Edging Machine

Scratch Awl

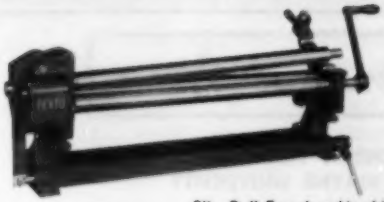
Setting Hammer

Straight Blade Snip

Foot Squaring Shear



Ring and Circle Shear



Slip Roll Forming Machine

Combination Brake and Folder

Adjustable Bar Folder

Hollow Mandrel Stake

Beakhorn Stake

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ASSOCIATION NEWS

(Continued from page 8A)

♦ Dr. M. Ray Karnes, chairman, department of industrial education, University of Illinois, addressed a combined meeting of the Central Kentucky Industrial Education Association and the Industrial Arts Club of Eastern Kentucky State College, on March 1, 1956, at a dinner meeting held in the Keen Johnson Student Union Building on the college campus.

The meeting was attended by representatives of the State Department of Education, faculty members from the University of Kentucky, the staff of Lafayette Vocational School, Lexington, Ky., central Kentucky industrial-arts teachers, and a large group of college industrial-arts students.

Dr. Karnes spoke on the subject, "Long-Range Planning for the Improvement of Industrial Arts Education Programs."

♦ The annual spring conference of the Wisconsin Department of Audio-Visual Instruction will be held in Green Bay, on April 26 and 27.

Industrial Education Graduate Club, Bennett College, Bradley University

Top row, left to right: Art Evans, Ralph DeWeber, Verlin Hughes, Albert Smith, G. A. Allen, Walter Bunning, John Kluzak, R. D. Teague, Don Begg, Walter Swallow, Herman Greisenbrock, Gerald Petty, W. V. Hale, Art Buhr, F. Theodore Paige.

Middle row, left to right: Waino Thompson, Dr. Beryl Cunningham, John W. Simpson, Wesley Luckstead, Lucius Thompson, Dempsey Reid, Karl Hart, George Petersen, John Hawse, Ira Johnson, Art Thoisen, Ernest Edwards, O. L. Downs, Dr. Ray Lapley.

Bottom row, left to right: Leslie Grigg, Martin Gonser, Chun Chow, Carl Barber, Oliver Press, Don Perry, Robert Haddick, Bruce Lynch, and Fred Zimmerman.

Personal News

SECHREST JOINS STAFF OF WAYNE UNIVERSITY

Dr. Charles H. Sechrest joined the staff of the Industrial Teacher Education Department, Wayne University, beginning the spring semester, January 30, 1956. Dr. Sechrest is well known throughout the Detroit metropolitan area as a very successful industrial education teacher, both in the public schools of Detroit and as a co-operating faculty member of Wayne University. He has had a wide variety of industrial experience as well as teaching experience. He spent four years in various shops in the automobile industry before entering Michigan State Normal College in 1931. While doing his undergraduate studies, he worked as a bushelman and presser in a tailoring shop. Since beginning his career as a teacher in the Detroit public schools, Sechrest has returned to industry several summers. Other summers, he has done general contracting in painting and the building trades.

His teaching experience in the Detroit public schools has been in both elementary and junior high school levels. He also served as a critic teacher for Wayne University for 15 years, and as a special instructor in the late afternoon and evening program at Wayne. Dr. Sechrest has taught summer sessions at Stout State College and at State College of Washington, Pullman, Wash. He has been invited to teach at State Teachers College, St. Cloud, Minn., during the 1956 summer session. He received his graduate degrees from Wayne University; his master's degree in 1942, and his Ed.D. in 1953.

One of Dr. Sechrest's major assignments at Wayne will be the direction of research at the master's and doctoral levels. He is well prepared for this assignment because of his contribution to literature in the field of industrial education. He is coauthor of the textbook, "Materials of Construction" with Dr. Verne C. Fryklund. He is coauthor also of three bulletins published by the Detroit Board of Education. One of these publications was a handbook for student teaching. This publication, along with his years of experience

Dr. Charles H. Sechrest

as a critic teacher, has prepared him well for another of his major assignments at Wayne which will be to give general supervision to student teaching.

Prior to his appointment at Wayne University, Dr. Sechrest was a counselor at McMichael Junior High School; he held that position since 1954.

Dr. Sechrest is a member of Phi Delta Kappa, Mu Sigma Pi, and Epsilon Pi Tau. Other organizations which he is a member of include the American Industrial Arts Association, American Council on Industrial Education, American Vocational Association, and the Michigan Industrial Education Society.

JOHN O. CONAWAY CHOSEN STATE SUPERVISOR

John O. Conaway assumed his new duties as supervisor of industrial arts of the state of Indiana in February, 1956. This is a newly created position and a much needed one in Indiana.

Mr. Conaway taught industrial-arts subjects at Kokomo, Ind., since 1936, with a four-year period out for military service in the United States Navy.

Mr. Conaway is especially well qualified for his new job. He is a graduate of Indiana State Teachers College, where he earned his B.S. degree in 1936 with a major in industrial arts and a minor in science. In 1941 he earned the M.A. degree at Columbia University. He is currently writing his doctoral dissertation after completing all course requirements at Indiana University.

In addition to his teaching certificate, Mr. Conaway also holds the Guidance Director's license, the Secondary School Principal's license, and the Superintendent's license.

FRANK POWELL RETIRES

Frank Powell, veteran Wisconsin educator, will retire in July, 1956, after serving Wisconsin education for close to fifty years.

As a member of the Wisconsin State Department of Public Instruction, he has been head of the bureau for handicapped children since 1936. During the same time he was also high school supervisor and assistant superintendent assigned to publications, North-Central Association and supervision.

In 1909 he spent a year as rural school teacher. Following this, he was principal for six years of a 12-grade school, first at Thorpe and later at Nekoosa, Wis. He also served as city superintendent for 17 years at Platteville, Wis.

He was very active in the Wisconsin Teachers Association, and served as the first president of the South Western Teachers Association. He also was president of the Southern Teachers Association, and vice-president of the State Teachers Association.

He wrote the first state-wide teachers' credit union constitution in this country, and he is now serving his twenty-sixth year as president of this credit union.

Mr. Powell taught summer school for eight years at Platteville State College, Platteville, Wis. He has extremely many friends among the teachers in Wisconsin, and all of them wish him the best of luck for the future.

PROFESSOR HAINES RETIRES

Professor Ray E. Haines of the Department of Vocational Education, School of Education, New York University, is retiring at the end of this school year and was honored at a dinner given by his students, associates and other friends at the Fifth Avenue Hotel, 24 Fifth Ave., New York, N. Y., March 23, 1956.

Professor Haines was graduated from the University of New Hampshire 1913. He was active in athletics and began his career as a

(Continued on page 24A)

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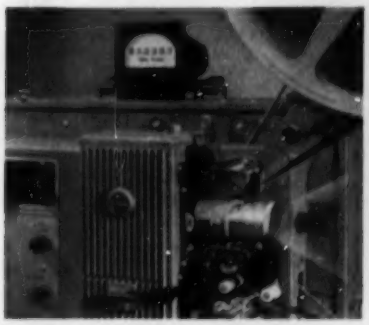

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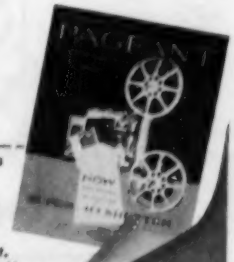

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PERSONAL NEWS

(Continued from page 22A)

teacher-coach at Franklin, N. H., in 1914. Since that time, he has served variously as teacher, coach, athletic referee, head teacher, director, state supervisor, army technical adviser, and for the past 25 years as instructor, professor, director of instructional shops, and cochairman in the Department of Vocational Education, School of Education, New York University.

The esteem in which he is held by all who have known him reflects in good measure his great ability, combined with a cordial and energetic personality. His contributions in the field of industrial arts are widely recognized. His many friends wish him the best of luck and supreme happiness in his well-deserved retirement.

DR. J. A. HANNAH ELECTED TO MOTOR WHEEL DIRECTORATE

Dr. John A. Hannah, president of Michigan State University, was elected to the board of directors of Motor Wheel Corporation, manufacturer of appliances and a major supplier to the automotive and agricultural industries.

He also is a director of Michigan Bell Telephone Company and the Detroit branch of the Federal Reserve Bank of Chicago, and a Governor of the American National Red Cross.

♦ EDWIN W. DYAS, holder of a bachelor's degree from the University of Minnesota, has joined the teaching staff at the Stout State College, Menomonie, Wis. He will teach woodworking. Mr. Dyas was teacher of industrial arts and principal in the high school at Cambridge, Neb. He also taught mathematics, woodworking, and drafting in the schools of Omaha, Neb.

♦ HAROLD H. HAFLIN is instructor of machine-shop practice at Stout State College, Menomonie, Wis. He earned his bachelor's degree at Fairmont State College, Fairmont, W. Va. He completed his master's degree at Stout State College. Before joining the Stout faculty, Mr. Haflin gained industrial experience in Youngstown, Ohio, and taught in Hubbard, Ohio, and on the faculty of Fairmont State College.

♦ MARVIN M. KUFAHL, formerly a resident of Eau Claire, Wis., has been assigned an instructorship in sheet metal at Stout State College, Menomonie, Wis. A graduate of Stout, Mr. Kufahl has been an assistant instructor in sheet metal at the college during the first semester.

♦ DR. BENJAMIN C. WILLIS, general superintendent of schools in Chicago, has been elected chairman of the National Committee for Education in Family Finance. He succeeds Dr. Herold C. Hunt, who served as chairman since the Committee's inception in 1947, and who was recently named Under Secretary of Health, Education and Welfare by President Eisenhower. Dr. Hunt will remain a member of the Committee.

♦ LLOYD NELSON received the degree of Ed.D. at the University of Illinois on October 15, 1955.

Dr. Nelson is assistant professor of industrial arts, department of Industrial Arts, Ball State Teacher College, Muncie, Ind.

♦ WILLARD J. MCCARTHY, formerly assistant professor of industrial arts at Murray State College, Murray, Ky., has joined the faculty of Illinois State Normal University, Normal, Ill. He is teaching metalwork there.

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FINAL EXAM — MECHANICAL DRAFTING II-A

ANTHONY CALANDRO
Eastchester High School
Tuckahoe, N. Y.

Part I (25 Credits)

NOTE: Read carefully, then mark a *T* or *F* in front of each statement according to whether it is *True* or *False*.

.. 1. Every drawing must be checked by the teacher before it may be inked.
.. 2. While filling the ruling pen it should be held over the drawing.
.. 3. The blades of the pen, while inking, should be held parallel to the direction of the line.
.. 4. Circles and arcs are to be inked before vertical and horizontal lines.
.. 5. An auxiliary view is an added view that shows the true shape of a slanting surface.
.. 6. A line parallel to a plane, will have a projection on that plane that will be equal to its true length.
.. 7. A line perpendicular to a plane is projected onto that plane as a straight line.
.. 8. The auxiliary view is extremely important in the making of the development.
.. 9. A development consists of the top view only.
..10. There are two general classes of surfaces: plane and curved.
..11. When a cylinder is developed its pattern becomes a rectangle.
..12. The length of the rectangle (development) is equal to the diameter of the cylinder.
..13. All construction lines are drawn in red.
..14. It is permissible to draw one half of the pattern if the drawing paper is too small.
..15. A cone to be developed is considered a pyramid with many sides.
..16. The pattern of a cone is developed in the same manner as a pyramid.
..17. The true length is found by revolving the top view.
..18. All lines are the same thickness when inked.
..19. Sheet metal drawing is another name for Mechanical Drawing II-A.
..20. A cylinder is usually divided into 12 parts for developing.
..21. Numbering the different points is of great help in developing patterns.
..22. Pattern and development are synonymous.
..23. A truncated cone is one that has had its top cut off.
..24. The pattern of a truncated cone is irregular.

(Continued on next page)

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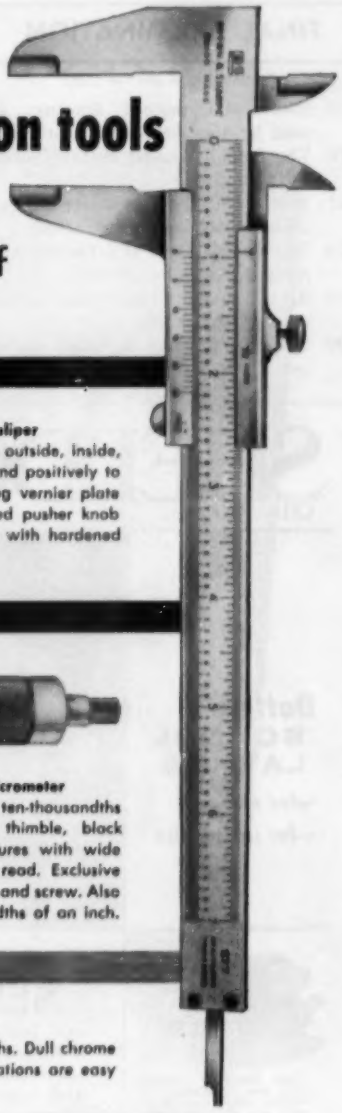

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FINAL EXAMINATION

(Continued from previous page)

..25. Sheet-metal pattern drawings are used by the sheet-metal worker.
..26. The funnel is based on the cylinder and the cone.
..27. Visible and invisible object lines are the same thickness when inked.
..28. The French curve is a necessary instrument for all draftsmen.
..29. An ellipse and a circle resemble each other in appearance.
..30. The metal scoop is based on the cylinder and the cone.
..31. In developments it is necessary to number all points in all views.
..32. In developing such objects as pyramids, cones, etc., it is not always necessary to determine the true lengths.
..33. In making a development of a truncated cylinder, a French curve is used.
..34. Scale ½ in. = 1 ft. means that the object is drawn to a size of one half the whole.
..35. Scale ⅛ in. = 1 ft. means that the object is drawn to a size of one twelfth the whole.
..36. Scale 3 in. = 1 ft. means that the object is drawn one third the whole.
..37. Scale 1 in. = 1 ft. means that the object is drawn one twelfth the whole.
..38. The three piece elbow is based on the cylinder.
..39. The metal match box is based on the cone.
..40. When two curved surfaces intersect, the line of intersection becomes a curve.
..41. The top view of an object may also be referred to as the plan.
..42. A cone is a solid whose base is enclosed by a circle.
..43. An octagon is an eight sided plane figure.
..44. A pentagon is a five sided plane figure.
..45. A hexagon is a seven sided plane figure.
..46. A blueprint is made by placing the ink tracing with the inked lines down against the blueprint paper and exposing the whole to a strong light.
..47. A fairly strong solution of ammonia is exceptionally good for cleaning inking instruments.
..48. A good draftsman should keep his desk clear of impedimenta.
..49. A good draftsman is always careful of his instruments, particularly of his T square, as dropping it will invariably cause damage.
..50. Whenever a T square other than your own is used, it becomes necessary to reset your drawing paper.

KEY — PART I. MECHANICAL II-A

1. T	11. T	21. T	31. T	41. T
2. F	12. F	22. T	32. F	42. T
3. T	13. T	23. T	33. T	43. T
4. T	14. T	24. T	34. F	44. T
5. T	15. T	25. T	35. F	45. F
6. T	16. T	26. T	36. F	46. F
7. F	17. T	27. F	37. T	47. T
8. T	18. F	28. T	38. T	48. T
9. F	19. T	29. F	39. F	49. T
10. T	20. T	30. T	40. T	50. T

ENGINEERING DRAFTING TEST

WALTER H. HARRINGTON
Head, Engineering Drafting
New Hampshire Technical Institute
Manchester, N. H.

Machine and Tool Design **Sheet I**

TEST I

(*First Semester*)

Check the correct answer.

1. A cutting tool having a piloted end and used to enlarge the diameter of a hole to a given depth is known as a:
   ( ) *a*) Twist drill
   ( ) *b*) Countersink
   ( ) *c*) Die
   ( ) *d*) Counterbore
   ( ) *e*) Knurling tool
2. To ream is to finish a drilled or

(Continued on page 28A)

SHELDON Precision LATHES
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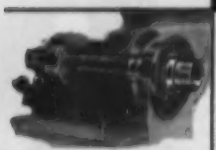
—for instructors



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DRAFTING TEST

(Continued from page 26A)

punched hole very accurately using a rotating fluted tool of the required diameter.

( ) *a*) True
( ) *b*) False

3. To finish a round spot on a rough surface, usually around a drilled hole, in order to give a good seat to a screw or bolthead, cut usually 1/16 in. deep, by a rotating milling cutter is to:
   ( ) *a*) Lap
   ( ) *b*) Turn
   ( ) *c*) Spotface
   ( ) *d*) Countersink
   ( ) *e*) Bore
4. Tapping is followed by drilling where threads are required.
   ( ) *a*) True
   ( ) *b*) False
5. A tool used for cutting external threads is called a:
   ( ) *a*) Tap
   ( ) *b*) Reamer
   ( ) *c*) Chamfering tool
   ( ) *d*) Die
   ( ) *e*) Broach
6. The elevation of an object is generally determined by the view containing the greatest amount of:
   ( ) *a*) Lines
   ( ) *b*) Dimensions
   ( ) *c*) Contour
   ( ) *d*) Finished surfaces
   ( ) *e*) Height
7. All notes on a drawing should be printed horizontally.
   ( ) *a*) True
   ( ) *b*) False
8. One half a thousandth is expressed by:
   ( ) *a*) .5000
   ( ) *b*) .0050
   ( ) *c*) .0500
   ( ) *d*) .0005
   ( ) *e*) .00005
9. Check the largest drill size.
   ( ) *a*) No. 70 (.0280)
   ( ) *b*) U (.3680)
   ( ) *c*) 29/64
   ( ) *d*) 5/32
   ( ) *e*) B (.2380)
10. All location dimensions must be given from center lines and finished surfaces.
    ( ) *a*) True
    ( ) *b*) False

Machine and Tool Design Sheet II

TEST IA

(First Semester)

Check or fill in the correct answer.

11. To bevel a sharp external edge is to:
    ( ) *a*) Crown
    ( ) *b*) Feather
    ( ) *c*) Swage
    ( ) *d*) Chamfer
    ( ) *e*) Chase
12. To soften a metal piece and remove internal stresses by heating to its critical temperature and allowing to cool very slowly is known as:
    ( ) *a*) Carburizing
    ( ) *b*) Galvanizing
    ( ) *c*) Annealing
    ( ) *d*) Pack-hardening
    ( ) *e*) Sheradizing
13. Fillets, Rounds, and Die-Outs are found on which of the following drawings:
    ( ) *a*) Sheet-metal layouts
    ( ) *b*) Structural shapes
    ( ) *c*) Castings
    ( ) *d*) Bearings
    ( ) *e*) Forgings
14. If a square corner appears on a cast iron drawing, what does this indicate?
    ( ) *a*) The draftsman has made a mistake.
    ( ) *b*) The machinist must omit the finish.
    ( ) *c*) The patternmaker must make a core.
    ( ) *d*) The foundry must provide draft.
    ( ) *e*) That one or both surfaces are to be machined.
15. The note "Remove all sharp edges and burrs" is directed to the ( ) shop.
16. All dimensions on a drawing must read from the ( ) and from the ( ) side of the drawing.

(Continued on page 30A)

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DRAFTING TEST

(Continued from page 28A)

17. Who is responsible for the accuracy and the tolerances stated on all drawings?
    ( ) *a*) The Shop Foreman
    ( ) *b*) Engineer
    ( ) *c*) Plant Manager
    ( ) *d*) Draftsman
    ( ) *e*) Machinist
18. A small block or wedge inserted between a shaft and hub to prevent circumferential movement is called a:
    ( ) *a*) Lug
    ( ) *b*) Neck
    ( ) *c*) Key
    ( ) *d*) Pad
    ( ) *e*) Kerf
19. To polish with abrasive on a cloth wheel or other soft carrier is to:
    ( ) *a*) Planish
    ( ) *b*) Buff
    ( ) *c*) Fettle
    ( ) *d*) Burnish
    ( ) *e*) Feather
20. All drilled holes made from numbered or lettered drills must appear on drawings giving both number and letter and accompanied by their decimal equivalent carried out to 4 places.
    ( ) *a*) True
    ( ) *b*) False

KEY FOR TEST I

1. d	8. d	15. Machine
2. True	9. b	16. Bottom and Right
3. c	10. True	
4. False	11. d	17. d
5. d	12. c	18. c
6. c	13. c	19. b
7. True	14. e	20. a

GENERAL FARM AND HOUSE WIRING TEST

JAMES A. SAYER
Industrial Arts Instructor
Virginia, Minn.

Possible Number Correct: 185

Multiple Choice

Directions: The following questions are of the multiple-choice type. After each statement there are several answers. You are to choose the one best answer and then put the number of that answer in the blank space to the left of the question. The first question is answered as an example.

4 X. The smallest size wire that the N.E. Code allows to be used on an appliance circuit is: (1) 6; (2) 8; (3) 10; (4) 12; (5) 14.

____ 1. Most wire used for ordinary wiring of buildings is made from: (1) brass; (2) aluminum; (3) silver; (4) copper; (5) tin.

(Continued on page 32A)

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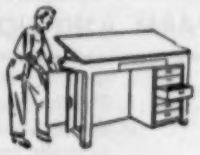

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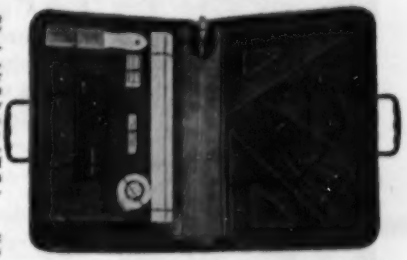

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FARM AND HOUSE WIRING

(Continued from page 30A)

2. The outermost covering of wire that is buried in the ground is generally made of: (1) rubber; (2) plastic; (3) asphalt saturated cotton braid; (4) steel; (5) lead.
3. The *hot* or *live* wire of a wiring system is always: (1) black; (2) green; (3) red; (4) yellow; (5) white.
4. For basements, barns, and other such buildings R.E.A. requires that the boxes be made of: (1) galvanized steel; (2) black enameled steel; (3) aluminum; (4) porcelain; (5) bakelite.
5. When using a bakelite surface switch or outlet the cable must be fastened within: (1) 4; (2) 6; (3) 8; (4) 10; (5) 12 inches of the unit.
6. When using any one of three systems of wiring you must have the wire supported at least every: (1) 12 in.; (2) 3 ft.; (3) 4½ ft.; (4) 8 ft.; (5) 10 ft.
7. The amount of electricity a device consumes in a given period of time is measured in: (1) amps; (2) ohms; (3) volts; (4) watts.
8. The loom that is used for wiring is made from: (1) porcelain; (2) rubber; (3) plastic; (4) cotton braid; (5) steel.
9. When wiring your buildings you want to use 220 volts if you expect to use more than: (1) 100 watts; (2) 250 watts; (3) 500 watts; (4) 600 watts; (5) 1000 watts.
10. One horsepower measured in electricity is equal to: (1) 467 watts; (2) 647 watts; (3) 746 watts; (4) 764 watts; (5) 1000 watts.
11. Number 12 wire will generally safely carry: (1) 10 amps; (2) 15 amps; (3) 20 amps; (4) 25 amps; (5) 30 amps.
12. When making a western union splice the number of turns in each wire is at least: (1) 2; (2) 3; (3) 4; (4) 5; (5) 6.
13. The most common voltage used for local distribution is: (1) 115 volts; (2) 230 volts; (3) 450 volts; (4) 2300 volts; (5) 23,000 volts.
14. The amount of electricity that you use in a month is measured with a: (1) ammeter; (2) ohmmeter; (3) voltmeter; (4) wattmeter.
15. During normal times a new National Electric Code is issued every: (1) 2 years; (2) 3 years; (3) 4 years; (4) 5 years; (5) 7 years.
16. To add outlets after an installation has been made usually costs about: (1) twice as much; (2) 3 times as much; (3) about the same; (4) 4–5 times as much, as when the job was first done.
17. The best type of lighting that gives the least eyestrain is: (1) direct; (2) semidirect; (3) diffused.
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19. The *pressure* or electromotive force of an electrical system is measured by a unit known as: (1) amperes; (2) volts; (3) watts; (4) ohms; (5) coulombs.
20. The average ¼ horsepower motor uses about: (1) 150 watts; (2) 200 watts; (3) 275 watts; (4) 325 watts; (5) 375 watts.

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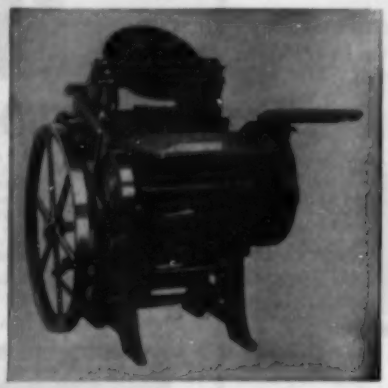

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_____ 21. For incoming service the N.E. Code requires that the minimum wire size be: (1) 4; (2) 6; (3) 8; (4) 10; (5) 12.

_____ 22. In a 32-volt system the smallest size wire allowed is: (1) 8; (2) 10; (3) 12; (4) 14; (5) 16.

_____ 23. The N.E. Code requires that the depth of all outlet boxes in new work be at least: (1) ½ in.; (2) 1 in.; (3) 1½ in.; (4) 2 in.; (5) 2½ in.

_____ 24. For most installations R.E.A. requires outlet boxes and switch boxes to be: (1) black enameled; (2) galvanized; (3) moisture proof; (4) nonmetallic.

_____ 25. Nonmetallic boxes or surface mountings can be used only with: (1) conduit; (2) knob and tube; (3) nonmetallic cable; (4) armored cable.

_____ 26. When mounting boxes between studs on strips of wood the code requires that the wood be: (1) ⅜ in. thick; (2) ¾ in. thick; (3) ⅞ in. thick; (4) 1 in. thick.

_____ 27. No matter what system is used you should always leave at least: (1) 4 in.; (2) 6 in.; (3) 8 in.; (4) 10 in.; (5) 12 in., of wire stick out of the box.

_____ 28. The type of cable the code recommends for farm use is: (1) nonmetallic; (2) armored cable; (3) lead; (4) USE cable.

_____ 29. If nonmetallic cable is used the code requires that any bends have a diameter of: (1) 3; (2) 5; (3) 6; (4) 8; (5) 10, times the diameter of the cable.

_____ 30. Armored cable is best cut with: (1) hack saw; (2) electrician's pliers; (3) jackknife; (4) pipe cutter; (5) tin snips.

_____ 31. Armored cable must be supported every: (1) 2 ft.; (2) 3 ft.; (3) 4¼ ft.; (4) 5½ ft.; (5) 6–10 ft.

_____ 32. When installing conduit the run from one box to another cannot have more than: (1) one quarter turn; (2) 2 quarter turns; (3) 3 quarter turns; (4) 4 quarter turns; (5) 5 quarter turns.

_____ 33. A type of wiring material with EMT stamped on it is also known as: (1) rubber covered cable; (2) lead cable; (3) thin wall conduit; (4) armored cable; (5) thick wall conduit.

_____ 34. The easiest and fastest way to put up BX is with: (1) straps; (2) staples; (3) nails; (4) boring holes in studs; (5) with wood cleats.

_____ 35. The code requires that all cable must be supported within: (1) 6 in.; (2) 8 in.; (3) 10 in.; (4) 12 in.; (5) 18 in., of a box.

_____ 36. In knob and tube wiring the distance between wires must be: (1) 1 in.; (2) 1¾ in.; (3) 2½ in.; (4) 4 in.; (5) 6 in.

_____ 37. When the bell is not ringing a bell transformer only draws about: (1) 1 watt; (2) 2 watts; (3) 3 watts; (4) 4 watts; (5) 5 watts.

_____ 38. An electric range requires No. 6 wire and separate fuses with a rating of: (1) 20 amps; (2) 25 amps; (3) 30 amps; (4) 40 amps; (5) 50 amps.

_____ 39. The largest rating for screw-in or plug-type fuses is: (1) 20 amps; (2) 25 amps; (3) 30 amps; (4) 40 amps; (5) 50 amps.

_____ 40. Conduit is sold in lengths that are: (1) 6; (2) 8; (3) 10; (4) 15; (5) 20 ft. long.

_____ 41. Thin wall conduit is cut with: (1) hack saw; (2) pipe cutter; (3) nicked with a file and broken; (4) tin snips; (5) any saw.

(Continued on next page)

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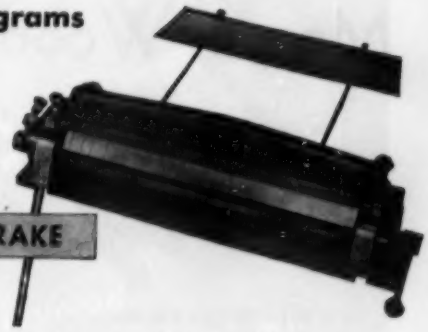

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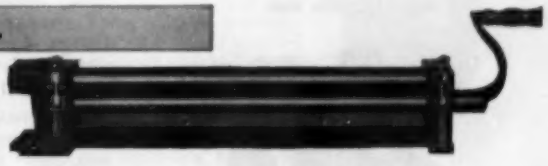

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FARM AND HOUSE WIRING

(Continued from previous page)

____ 42. The red antishort fiber put into BX cable is called a: (1) connector; (2) coupling; (3) bushing; (4) cover; (5) strap.

____ 43. The smallest wire that may be used on an appliance circuit is: (1) 8; (2) 10; (3) 12; (4) 14; (5) 16.

____ 44. When running a single wire through a timber you must use a: (1) porcelain tube; (2) piece of loom; (3) cleat; (4) knob.

____ 45. When you tap onto a single wire it must be supported within: (1) 4 in.; (2) 6 in.; (3) 8 in.; (4) 10 in.; (5) 12 in., of the tap.

____ 46. In knob and tube wiring the wire must be above the surface at least: (1) ½ in.; (2) 1 in.; (3) 1½ in.; (4) 2 in.; (5) 2½ in.

____ 47. The main purpose of a service head is to: (1) make a good appearance; (2) separate the individual wires; (3) hold the top end of the cable or conduit; (4) keep out water.

____ 48. The greatest number of wires that can be used in ½-in. conduit is: (1) one; (2) two; (3) three; (4) four; (5) five.

____ 49. From the top of your yard pole down to the meter and fuse boxes you will have at least: (1) 2 wires; (2) 3 wires; (3) 4 wires; (4) 5 wires; (5) 7 wires.

____ 50. The main concern with a hay mow light is that it is: (1) dust proof; (2) out of the way; (3) protected from injury; (4) near the ladder.

True-False

Directions: The following questions are of the true-false type. If the statement is more nearly true than false put a plus (+) in the blank space to the left of the question. If it is more nearly false put a zero (0) in the blank space. The first question is answered as an example.

\+ X. The code requires that conduit be supported every 6–10 ft.

____ 51. R.E.A. requires that all switches used for farm wiring have a *T* rating.

____ 52. A 3-way switch has *On-Off* marked on it.

____ 53. A switch with an ordinary Underwriter's rating may be used to its full amperage rating when used to control bulbs.

____ 54. If a cable is run across joists and no holes are bored guard strips or a running board must be used.

____ 55. The white wire is always hooked up as the *hot* wire.

____ 56. If a junction box is used it may be set back from the surface and covered with plaster or other wall covering.

____ 57. No. 10 wire is satisfactory for hooking up a hot water heater.

____ 58. With knob and tube wiring right angle turns may be made by using cleats.

____ 59. A hot water heater is required to have a separate switch and separate fuses.

____ 60. The code does not require anything special for making splices in cable.

____ 61. Any motor-driven device must have a separate switch unless it has an easily disconnected plug.

____ 62. With a B. & S. wire gauge No. 2 wire is smaller than No. 6 wire.

____ 63. The most common name for nonmetallic cable is BX.

____ 64. In old work installations where you are adding to or putting in

(Continued on page 36A)

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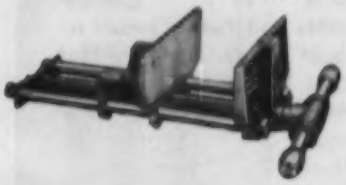

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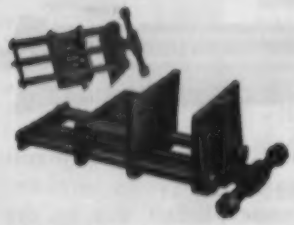

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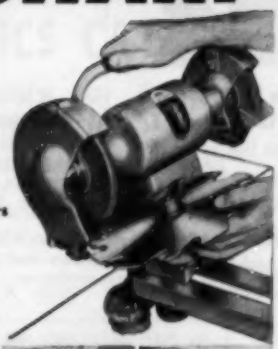

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FARM AND HOUSE WIRING

(Continued from page 34A)

new wiring the boxes may be only ½ in. deep.

_____ 65. With a lighting plant you get maximum battery life by keeping them fully charged all the time.

_____ 66. The ordinary frosted light bulb is an example of diffused lighting.

_____ 67. BX may be used for wiring when you use a nonmetallic box made of bakelite or porcelain.

_____ 68. When hooking up a switch box the line connects to the top and the load connects to the bottom.

_____ 69. The best type of cable for farm use is covered with neoprene.

_____ 70. The ground wire from a fuse box is generally well insulated.

_____ 71. Solderless connectors may be used for making splices in knob and tube wiring.

_____ 72. When using 220 volts you have two fuses. One is for the hot wire and the other is for the ground wire.

_____ 73. When two or more lights are controlled by one switch they are hooked in series.

_____ 74. A pigtail splice may be used if there isn't any strain on the wires.

_____ 75. Nonmetallic cable is the fastest to install because it can be supported with staples.

Completion

Directions: The following questions are of the completion type. In each one a key word is left out or the question isn't answered. You are to think of the correct term and then write it in the blank space to the left of the question. The first one is answered as an example.

1000 X. A kilowatt is equal to ..... watts.

_____ 76. To increase egg production lights are used in the poultry house. Generally a 40–50 watt bulb is enough for every .... square feet of floor space.

_____ 77. If you have a 6 volt plant it isn't practical to have wires more than .... feet long.

_____ 78. Before working on or adding to any existing wiring be sure to pull the main .....

_____ 79. When working on *old work* installation and you are cutting a hole in a plastered wall always saw so the teeth cut on the .... stroke.

_____ 80. The threaded piece of pipe fastened to the bottom of a box

(Continued on page 38A)

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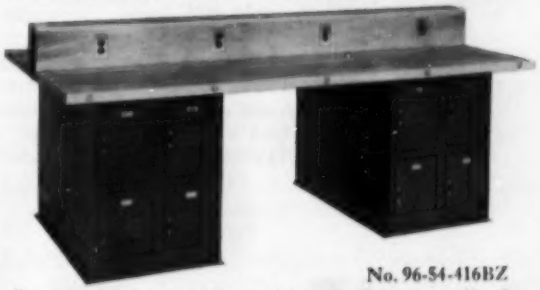

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School .....
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FARM AND HOUSE WIRING

(Continued from page 36A)

and used to attach a fixture is known as a .....

_____ 81. A special type of pipe or tubing used to hold wires is known as .....

_____ 82. The round disk in a box that may be removed to bring in wires is referred to as a .....

_____ 83. If you bought a new 180 amp Farm Welder what size wire would you need to hook it up? ....

_____ 84. What size fuse would you have to use for the welder?

_____ 85. The one other thing that you would check before using the welder would be the .... to see if it was large enough.

_____ 86. All electrical equipment that you use should be approved by .....

_____ 87. The N.E. Code requires that an outlet for every 20 feet or major fraction thereof, but recommends one for every .... feet.

_____ 88. Where it is possible to touch a fixture and a water faucet at the same time the fixture should be made of .....

_____ 89. Outside wire is weatherproof and the conductor is always .....

_____ 90. Where a pair of single wires enter a box or switch they must be covered with .....

_____ 91. With exposed knob and tube wiring, guard strips as high as the insulators and ⅞ in. thick must be used. These can't be closer than ....

_____ 92. or further than .... away.

_____ 93. To make a good installation all joints should be .....

_____ 94. The code states that all wires within .... feet of the floor are subject to mechanical injury and must be protected.

_____ 95. To relieve any strain on the screw that fastens a wire to the receptacle all drop cords should have a .... in each end.

_____ 96. If nonmetallic boxes are used the cable must be supported within .... inches of the box.

_____ 97. When any type cable goes into a metal box the code requires that it is held there with a .... of the type for the cable used.

_____ 98. Where the wires enter a building some type of .... must be used.

_____ 99. The two sizes of outlet boxes are ....

_____100. and .... inches in diameter.

Matching

Directions: The following questions are the matching type. In the upper list there are several terms, and in the lower list there are the four types of wiring. You are to match the type of wiring with the most appropriate term. Put the letter of the type of wiring in the blank space to the left of the term. The first one is answered as an example.

B X. Coupling

_____101. Porcelain tubes

_____102. Fiber bushings

_____103. Western Union Splice

_____104. Sill plate

_____105. Four ¼ turns

_____106. Porcelain boxes

_____107. EMT

_____108. Staples

_____109. Reamer

_____110. Kansas through Texas

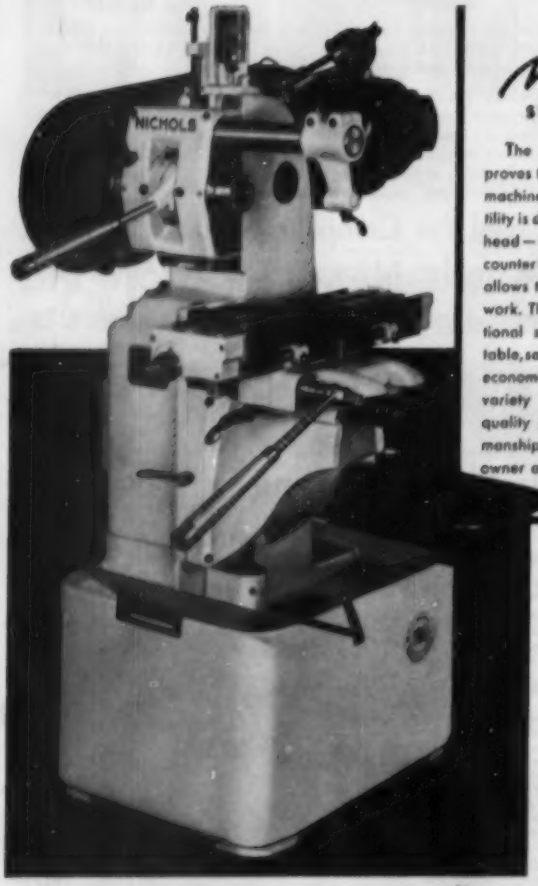
A. Nonmetallic sheathed cable
B. Conduit
C. Armored cable
D. Knob and tube wiring

Identification

Directions: Below are given several symbols used in electric wiring. Write in the name of each symbol in the blank space to the left of the symbol.

(Diagrams showing symbols are on page 40A)

(Continued on page 40A)



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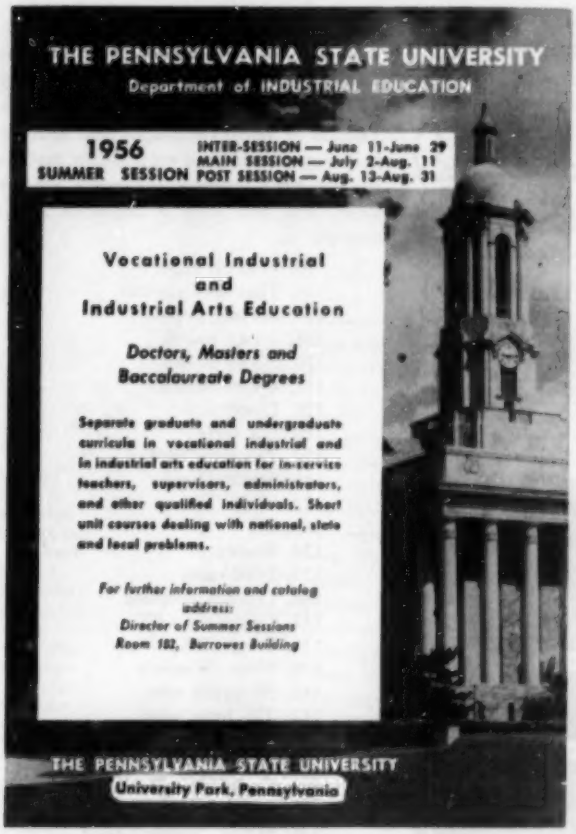
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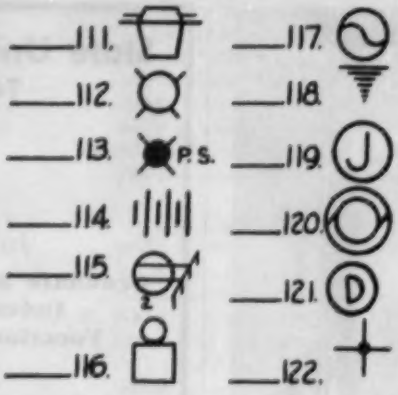
FARM AND HOUSE WIRING

(Continued from page 38A)

_____111.
_____112.
_____113.
_____114.
_____115.
_____116.
_____117.
_____118.
_____119.
_____120.
_____121.
_____122.



Identification and Matching

Directions: Below are a list of items used in electric wiring. The same items are on the benches with the number on them. You are to match the proper item with the proper name and then write in the number on the item opposite the name on the sheet. The first item is answered as an example.

1 X. Friction tape
_____123. Thin wall conduit
_____124. Surface switch
_____125. 2-way switch
_____126. 3-way switch
_____127. 4-way switch
_____128. Loom
_____129. Sill plate
_____130. Porcelain knob
_____131. Service head
_____132. Cleat
_____133. BX
_____134. Romex
_____135. Lead cable
_____136. Conduit coupling
_____137. Connector (BX)
_____138. Strap (BX)
_____139. Strap (Romex)
_____140. Neoprene wire
_____141. TW type wire
_____142. Bushing (BX)
_____143. Connector (Conduit)
_____144. Connector (Romex)
_____145. Ell (Conduit)
_____146. House or screw knob
_____147. Duplex outlet
_____148. Switch plate
_____149. Outlet box
_____150. K.O. plug or seal
_____151. Plug fuse
_____152. Cartridge fuse
_____153. Type S fuse
_____154. Wire connector
_____155. Bell wire
_____156. Asbestos wire
_____157. Thick wall conduit
_____158. Hickey
_____159. Lock nut
_____160. Multi-breaker

Directions: In each of the following questions you are asked to draw a wiring diagram. Be sure all your lines are clearly drawn and the proper symbols are used.

161.–165. Draw a diagram showing one light controlled by one switch.

166.–170. Draw a diagram showing two lights controlled by 3-way switches.

171.–175. Draw a diagram showing a light controlled from three different places.

176.–180. Draw a diagram with the service coming into the light and an outlet connected to the switch-box. The outlet should work all the time.

181.–185. Draw a diagram showing a front and rear doorbell hooked to the same transformer.

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KEY

Multiple-Choice

1. 4	14. 4	27. 2	40. 3
2. 5	15. 1	28. 1	41. 1
3. 1	16. 1	29. 5	42. 3
4. 4	17. 3	30. 1	43. 3
5. 2	18. 2	31. 5	44. 1
6. 3	19. 2	32. 4	45. 2
7. 4	20. 3	33. 3	46. 1
8. 4	21. 3	34. 2	47. 4
9. 4	22. 3	35. 4	48. 4
10. 3	23. 3	36. 3	49. 4
11. 3	24. 2	37. 1	50. 1
12. 3	25. 3	38. 5	
13. 4	26. 3	39. 3	

True-False

51. +	56. 0	61. +	66. 0	71. 0
52. 0	57. +	62. 0	67. 0	72. 0
53. 0	58. 0	63. 0	68. +	73. 0
54. +	59. +	64. +	69. +	74. +
55. 0	60. 0	65. 0	70. 0	75. 0

Completion

76. 200	88. porcelain
77. 50	89. solid
78. switch	90. loom
79. outward or back	91. 1"
	92. 2"
80. stud	93. soldered
81. conduit	94. 7
82. knockout	95. Underwriters knot
83. 6	
84. 50 amp	96. 6
85. transformer	97. connector
	98. service head
86. Underwriters	99. 3¼
87. 6	100. 4

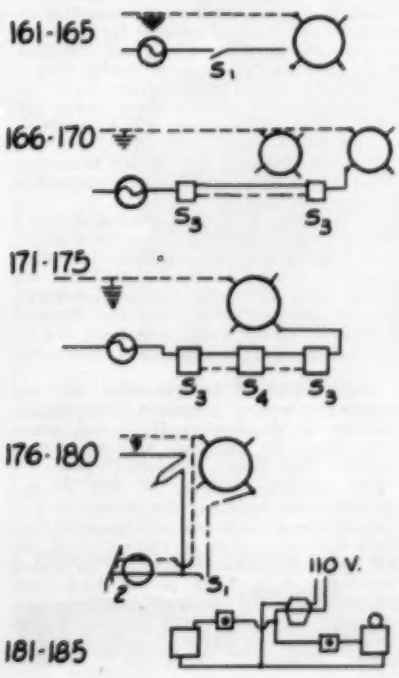
Matching

101. D	105. B	109. B
102. C	106. A	110. D
103. D	107. B	
104. A	108. C	

Identification and Matching

The answers will depend on the numbers that the instructor gives to each item.

DIAGRAMS



Identification

111. Transformer	117. Fuse
112. Ceiling Light	118. Ground
113. Pull Switch	119. Junction Box
114. Battery	120. Motor
115. Duplex Outlet	121. Drop Cord
116. Bell	122. Wires Connected

News Notes

NATIONAL SAFETY CONGRESS

"Achieving Safety Education for Children and Youth in School, College and Community" will be the theme of the School and College Sessions at the 44th National Safety Congress and Exposition. The sessions will be held in Chicago, October 20 to 26, at the Morrison Hotel.

Information may be obtained from Wayne P. Hughes, director, School and College Division, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

POSTDOCTORAL RESEARCH ASSOCIATES APPOINTED AT NATIONAL BUREAU OF STANDARDS

Five young scientists who have shown special promise of becoming creative leaders in basic research have been awarded Postdoctoral Research Associateships for advanced study at the National Bureau of Standards. The associateship program is sponsored jointly by the National Academy of Sciences—National Research Council and NBS.

The men, who have either received or shortly will be awarded their Ph.D. degrees, are scheduled to start work at NBS this year. They are: Earl C. Beaty, St. Louis, Mo.; Dr.

(Continued on next page)

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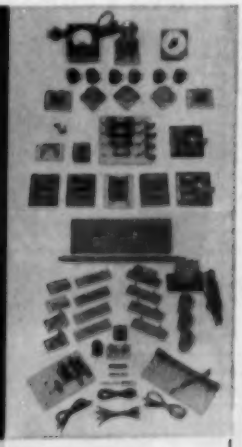

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NEWS NOTES

(Continued from previous page)

Tucker Carrington, Aberdeen Proving Ground, Md.; Dr. Marvin Marcus, Vancouver, Canada; Robert A. Piccirelli, Washington, D. C.; and Wesley A. Robinson, Seattle, Wash.

AWARD WINNERS, 1956 OFFICERS NAMED BY SCHOOL EXHIBITORS

Awards and scholarships were presented to three U. S. educators by Associated Exhibitors, National Education Association, at its annual meeting in Atlantic City, N. J. (in February).

The organization — made up of major suppliers of equipment to the school field — also named Z. A. March of Minneapolis, manager of school activities for Minneapolis-Honeywell Regulator Company, president for 1956. He succeeds Lois M. Corbeil of A. B. Dick Company, Chicago. Other new officers are John R. Rowe of Chicago, vice-president, and Paul L. Crabtree of Island Falls, Me., re-elected secretary-treasurer.

The 29th annual Associated Exhibitors American Education Award was presented to Edward M. Tuttle, retiring executive secretary of the American School Board Association, for outstanding service to education. Previous winners include Norman Vincent Peale (1955) and Walt Disney (1954.)

Annual S. D. Shankland scholarships for advanced study in school administration were presented to M. L. Rafferty, Jr., of Needles, Calif., and Marshall K. Berner of Urbana, Ill. Each award is valued at between $2,000 and $3,000.

The group, representing more than 300 major suppliers of school supplies and equipment, held its annual meeting in connection with the American Association of School Administrators.

LEAD PENCIL DRAWING AWARDS

The American Lead Pencil Company announces the publication of the 28th annual portfolio of lead pencil drawings that won national honors in the 1955 Venus-Scholastic Art Awards.

Under the Venus Drawing Pencil classification the company sponsors 20 National Awards. To encourage and help the students further their Fine Art education cash awards were distributed. Entries in this contest are received from students enrolled in secondary schools located in the United States and its possessions.

The 1955 Venus-Scholastic Art Awards portfolio along with a Venus Drawing pencil sampler is available by writing: Scholastic Educational Division of the American Lead Pencil Co. A nominal cost of 10 cents is charged to cover printing and handling.

DEMOUNTABLE PICKUP TRUCK

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A free plan designed by the engineering department of Masonite Corporation provides a bench at each side, if desired, for transporting the sportsmen. For sleeping, panels and mattresses are laid across the benches. The portable cover has a floor of Tempered Presdwood, an entry door with a window, and three Plexiglas windows. For a copy of the plan, No. AE-321, write the Home Service Bureau, Masonite Corporation.

♦ A public-relations brochure has been published as a public service by the Minnesota Industrial Arts Association. A committee of industrial-arts teachers collected the necessary data, did the art work, editing and compiling of the information contained therein. Copies are available to any industrial-arts teacher in the state of Minnesota free of charge for distribution at open houses, P.T.A. meetings, and the like.

The following members of the Minnesota Industrial Arts Association were responsible for this brochure:

Dr. Raymond H. Larson, committee chairman and editor, St. Cloud Teachers College; Dean Nordell, industrial-arts instructor, Worthington; Eldon Brandt, industrial-arts instructor, Winona; Wesley Wolhart, industrial-arts instructor, Columbia Heights; Howard Walton, St. Cloud Teachers College; and L. M. Lindemann, industrial-arts instructor, Dawson.

Single copies of this brochure may be obtained by sending a stamped, self-addressed envelope to Mr. Frederic H. Rowell, secretary, Minnesota Industrial Arts Association, Richfield High School, Richfield 23, Minn.

♦ On Saturday, January 28, 1956, Professor Roland H. Spaulding, Department of Vocational Education, School of Education, New York University, gave an address before the Air Power Education Symposium, Air Force Association, Utah Wing, at the Hotel Utah at Salt Lake City, Utah. The topic of his talk was "Technology and Education. The United States vs. Russia."

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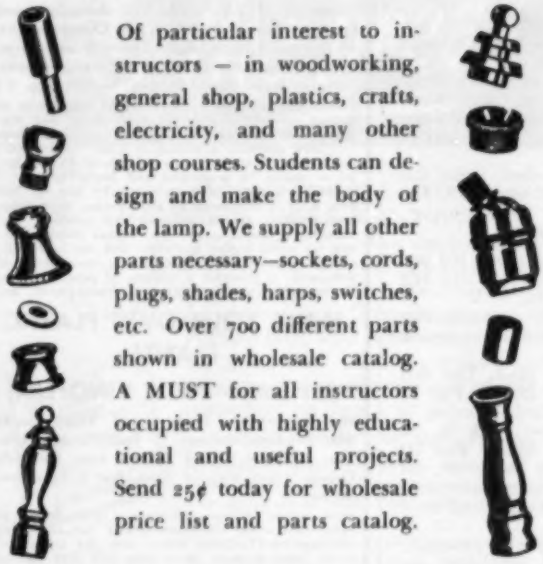
LAMP PROJECTS



Of particular interest to instructors – in woodworking, general shop, plastics, crafts, electricity, and many other shop courses. Students can design and make the body of the lamp. We supply all other parts necessary—sockets, cords, plugs, shades, harps, switches, etc. Over 700 different parts shown in wholesale catalog. A MUST for all instructors occupied with highly educational and useful projects. Send 25¢ today for wholesale price list and parts catalog.

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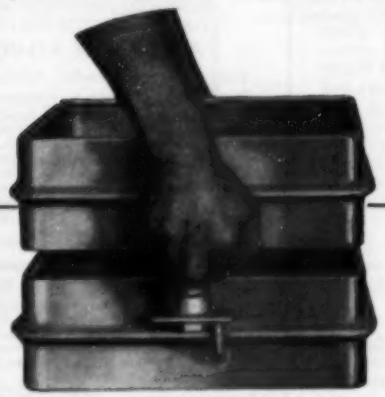

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DELKOTE® WOOD LACQUER is a unique new formulation, which embodies the best in modern lacquer technology. No finer finish is used—even on the highest priced furniture and the best pianos. Yet this lacquer is so formulated that it can be sprayed from an aerosol can!

Now your shop students can easily finish their handiwork with a professional-type lacquer. Two light coats, a little rubbing and polishing, give a deep, rich, long-lasting finish. This new aerosol product makes lacquer actually *easier to use than varnish.*

DELKOTE WOOD LACQUER was just introduced this past spring; yet it is already in use in hundreds of school shops and by maintenance personnel, home handy men, and hobbyists as well. Available in 12-ounce aerosol spray cans at $1.95 each, also in cartons of 12.

DELKOTE METAL LACQUER is a companion product, introduced at the same time. It is formulated to spray perfectly from the aerosol package, and is nonreactive to any metal surface. It protects, preserves, and beautifies copper, brass, bronze, and aluminum. It prevents tarnishing. It eliminates the need for frequent polishing of hinges, doorknobs, stair rails, and fixtures. A useful material in the shop, it is also being used in school maintenance, office, and home . . . wherever brightwork is a problem.

Like DELKOTE WOOD LACQUER, the METAL LACQUER comes in 12-ounce self-spraying aerosol cans at $1.95 apiece, and in cartons of 12. Mixed cartons are available on special order.

53-V-1

Both DELKOTE WOOD LACQUER and DELKOTE METAL LACQUER are sold by leading school supply distributors. If your regular supplier does not carry them, order direct.

DELKOTE, Incorporated
Box 1335, Wilmington 99, Del.
Box 574, Berkeley, California
Also makers of BOOK SAVER, BOOKOTE and DEL-FIX

New Publications

Basic Medical Terms and Techniques Simplified

By Minnie I. Paddock. Cloth, 148 pp., 5⅝ by 8½ in., illus., $3.50. American Technical Society, Chicago, Ill.

A concise reference book for medical technicians, registered and practical nurses, medical corpsmen, hospital administrative personnel, medical secretaries, and health service workers.

The text presents the medical terms this type of personnel meets most often.

Occupations and Careers

By Walter James Greenleaf. Cloth, 605 pp., 6⅞ by 9½ in., illus., $4.20. McGraw-Hill Book Co., Inc., New York 36, N. Y.

This book is designed for an occupations course, and covers information about typical occupations and industries.

It is divided into three parts. The first covers individual and local factors. Part II deals with occupations grouped according to the standard classification set forth in the "Dictionary of Occupational Titles." Part III discusses the occupations by industries; the proportion of workers under union agreement; the trends in union membership; and basic pay rates.

The appendix gives an outline of community survey, the 1950 census of population and labor force, and employed persons by occupations according to the 1950 census.

Home Wiring Handbook

By A. Carl Bredahl. Imitation leather, spiral binding, 142 pp., 5¼ by 7⅞ in., illus., $1. Westinghouse Electric Corp., Pittsburgh, Pa.

This is the fourth revised edition of this handbook.

The revision makes it easier to determine electric circuit requirements and also to conform to the newly revised Residential Wiring Handbook of the Industry Committee on Interia Wiring Design as well as the 1953 National Electrical Code.

The eleven chapters and appendix which comprise the handbook are: electrical equipment for the home, degrees of electrical living, electrical circuits, electrical control centers and service entrances, conductors — voltage drop and circuit protection, electrical outlets, communication systems, suggested specification for single family dwellings, estimating electrical costs, terms used in building design and construction, and miscellaneous charts and tables.

Art Metal Work and Jewelry

By Louis J. Haas. Paper cover, 64 pp., 4$^{15}/_{16}$ by 8⅛ in., illus., $3.50. Published by Louis J. Haas, 3 Gedney Terrace, White Plains, N. Y.

This is the fifth edition of this engaging little book, the author of which has had many years of occupational therapy work. He has written a number of these graphic self-instruction craft books. He is a master craftsman himself and the illustrations show that he also is an artist. The explanations that show how the work is to be done, are clear, precise, and readily understandable.

The book contains 42 projects besides a very fine exposition on how engraving is done.

Dictionary of Mechanical Engineering Terms

Originally compiled by J. G. Horner, and revised and enlarged by Staton Abbey. Cloth,

(Continued on page 46A)

NEW PLASTIC FILM DISCOVERY!

DuPont *MYLAR** POLYESTER FILM

Strongest of All Plastic Film Actually Used for Boat Sails — Has Amazing Characteristics of Extremely High Tensile Strength and Durability, being Able to withstand Temperatures Ranging from Minus 80 deg. to 300 deg. F.!

This unique material — the result of eight years of DuPont research — offers shop teachers and students a real opportunity to profit from new ideas . . . new projects. Available in 0.001" and 0.003" thicknesses, it has a tensil strength of 23,500 lbs. psi — retains its properties and flexibility over a temperature range of from minus 80 deg. to 300 deg. F. It is unaffected by oils, grease, most acids and alkalis. Resists moisture and solvents. Has exceptional dielectric strength. Makes ideal insulation for motor stator, generator and solenoid coils, capacitor; crashproof kites. When laminated and embossed, it provides a variety of new materials for decorative paneling, window shades, belts, etc.

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It's Easy --- With VINOFLEX

the Remarkable New Liquid Vinyl Plastic that Produces Foliage so Realistic and Life-Like it's Hard to Tell It From Live, Growing Leaves when Viewed from Just a Few Feet Away!

Now — your students can make a wide variety of authentic-looking evergreen plants for decorating windows and planter boxes with the same material used to make dolls that look and feel so real. Vinoflex, newest marvel of the plastic world, is a syrup-like liquid that pours easily and forms a tough, resilient, rubbery material when exposed to even heat of from 250 to 325 deg. F. One of its unique features is that it can be used to make *internal or External* reproductions of a mold. Molds can be made of metal, glass, plaster — anything that withstands 325 degrees for a few minutes. Vinoflex foliages are Fireproof, Washable, Fade-Resistant. Dreapless — can be cleansed with a damp cloth. Available in white opaque, clear, light or dark green. Vinoflex comes in 8-oz., pint, quart and gallon sizes. It's ideal for making an endless variety of toys and novelties, too!

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Build Sports Car Bodies, Boats, Work Bench Tops, Awnings, Furniture, etc.

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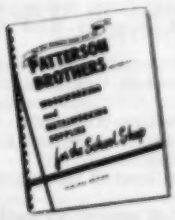
Catalog of WOODWORKING & METALWORKING MACHINERY, TOOLS AND EQUIPMENT

The new 1956 Patterson Brothers catalog, listing all the latest in: Metals, Benches, Electrical supplies, Finishing materials, Hand tools, Hardware, Machine tools, Metalworking tools, Portable Electric tools, Precision tools, Sheet metal equipment, Welding Equipment. Contains up-to-the-minute information on equipment needed for the complete school shop.



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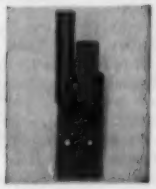

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Anyone can create these beautiful projects without experience

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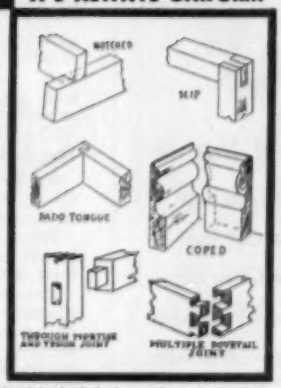
3,085 LBS. ACTUAL SHEARING STRENGTH PER SQUARE INCH

NO MATTER WHAT THE JOINT IT'S BOUND FIRM WITH ROGERS . . . and Rogers will Never Discolor Wood Materials. The joints shown here are only 6 of the 24 Typical Joints shown in Rogers Book of Woodworking Notes which you can have FREE.



It's full of helpful data, handy as a teaching aid. Send for Your Copy and Rogers Free Project Plans, TODAY!

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AMERICA'S FINEST HARDWOOD LUMBER FOR MODERN SCHOOL SHOPS . . . KILN-DRIED! SOFT-TEXTURED!

NEW! FREE! Catalog features 18 species of woods used by School Shops, with illustrations and descriptive text . . . Special items such as bench tops, drawing boards, dowels, turning squares, plywoods . . . Delivered prices east of Mississippi and f.o.b. prices west of Mississippi.

Our lumber is properly kiln-dried — correct as to grade, texture and dryness. Works easier, works better. More economical!

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HARDWOOD CORPORATION OF AMERICA

EDUCATIONAL LUMBER DIVISION
P. O. Box 1091
ASHEVILLE, N. C.

NEW PUBLICATIONS

(Continued from page 44A)

417 pp., 5⅛ by 7½ in., $6.50. Philosophical Library, New York 16, N. Y.

This is the seventh edition of this dictionary originally compiled by the late J. G. Horner and now enlarged and revised by Staton Abbey.

Horner's compilation forms Part II of the present book. This part, however, has also been revised. It is devoted to the general and traditional terms used by draftsmen, patternmakers, molders, boilermakers, smiths, machinists, etc.

Part III contains terms which have come into use during recent years, and gives the engineer the necessary insight into terms used by the metallurgist; the electrical and electronic engineer; the testing of radios; and the terms used in physics and chemistry.

The Atom in Our Hands

Paper cover, 40 pp., 7½ by 10⅓ in., illus. Union Carbide and Carbon Corporation, 30 East 42nd St., New York 17, N. Y.

A beautiful descriptive brochure, interestingly written up and illustrated in colors, describes the atomic activities of the Union Carbide and Carbon Corporation in its own plants and laboratories, as well as in the plants and laboratories which it operates for the government.

The booklet describes how U-235 is separated from U-238, and how radioisotopes are produced.

It also shows how these peaceful atoms are used in medicine, agriculture industry, and educational research.

the New B-G
CERAMIC CABINET
COMBINATION CLAY STORAGE UNIT AND WORK TABLE
Model No. CC 2
DESIGNED AND BUILT to fit an urgent need. Combines the best in flexibility and convenience. Recessed base permits foot space, providing easier, more comfortable working conditions. Constructed of hardwood and finished in natural — with easily accessible double door storage area 28" x 29" with dividing shelf for project storage. The outstanding feature is the galvanized lined portable clay storage area, 16" wide, 19" deep, and 24" high, mounted on casters for ultra convenience and time saving efficiency.
Model No. CC 2, complete as shown, $125.00
Functional Design
• Large maple top
• Enclosed cabinet
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• Recessed kick space
• Heavy construction
New 1956 B-G Catalog Now Ready, Write for Copy
BRODHEAD GARRETT CO.
50 Years Serving School Shops of America
4560 E. 71 ST. CLEVELAND 5, OHIO

Auto Radio Service Data Manual, Vol. 5 (AR-5)

Compiled and published by Howard W. Sams & Co., Inc., Indianapolis, Ind. Spiral binding, 256 pp., 8½ by 11 in., $3.50.

This volume covers 1954 and 1955 auto radios. The material will be of great help to service technicians because it contains full servicing instructions.

The data in this volume, plus that in the previous four volumes, presents the information required to service practically all postwar auto radios.

The radios covered in this volume are: Aircastle, Airline, Allstate, Automatic, Buick, Cadillac, Chevrolet, Chrysler, Coronado, Delco, DeSoto, Dodge, Firestone, Ford, Frazer, General Electric, GMC, Hudson, Kaiser, Karadio, Lincoln, Mercury, Mopar, Motorola, Nash, Nordic, Oldsmobile, Packard, Philco, Plymouth, Pontiac, Regal, Silvertone, Studebaker, Truetone, and Willys.

Basic Concepts in Vocational Guidance

By Herbert Sanderson. Cloth, 338 pp., 6⅛ by 9¼ in., $4.50. McGraw-Hill Book Co., New York, N. Y.

This book aims to help vocational counselors in their daily work, and to familiarize them with the principles and techniques employed successfully by other helping professions.

Chapters 1 and 2 discuss vocational guidance as a helping profession.

Chapters 3, 4, and 5, treat of the dynamics in vocational assistance.

Chapters 6, 7, and 8, present an analysis of the guidance process.

Chapters 9, 10, and 11, show what it means to help and counsel adolescents.

Oxyacetylene Welding

By Morgan H. Potter. Revised edition, cloth, 140 pp., 5⅜ by 8½ in., illus., $2.50. American Technical Society, Chicago, Ill.

This is the fourth edition of this practical manual and text. It contains all the recent developments in the field, plus the same basic material which has made it a handbook for welding instruction and guidance. Its concise but thorough treatment of oxyacetylene welding, hard surfacing, lead burning, and cutting makes it an admirable guide for the learner and a useful reference for the experienced tradesman. This book's simple, direct style, and carefully integrated illustrations lead the reader step-by-step through all phases of modern welding practice.

The 4-H Club Leader's Handbook

By T. T. Martin. Cloth, 148 pp., 5⅜ by 8⅞ in., $3.00. Harper & Brothers, New York, N. Y.

This book is a text for training volunteer leaders of 4-H clubs. It is also helpful to those who already are leaders of such clubs.

The book explains very clearly what the philosophy of 4-H clubwork should be. It enumerates the important factors in understanding youth. It also shows the ways to acquire and apply skills in learning, and gives the basic idea on 4-H club leadership. It discusses the status of 4-H club organizations, and the local evaluation of the club work.

The book also gives excellent suggestions for follow-up procedures, and what to do about dropouts. There also are suggestions for leaders' training conferences.

Jet — The Story of a Pioneer

By Sir Frank Whittle. Cloth, 320 pp., 5¾ by 8½ in., illus., $6. Philosophical Library, New York, N. Y.

This is a gripping story of the building, designing, financing, and testing of the first

turbo jet. It is written by the builder himself who gives the reader a very drastic picture of the many financial difficulties, heartbreaking struggles with various engineering problems, and the disappointments because of opposition by industrial and governmental groups who were opposed to what he was doing.

In spite of all of this, however, there is no denying the real satisfaction which this gifted pioneer got out of the successful termination of the job he had set for himself — the building of a practical turbo-jet engine and the actual flying of an airplane powered with such an engine.

Business and Personal News

ROBERT W. CAMPBELL RECEIVES APPOINTMENT

Robert W. Campbell has been appointed to the educational sales department of Stanley Tools.

Mr. Campbell will be responsible to Fred J. Gross, manager of the department, and will call on the schools and teacher training colleges in New England and attend state and national conventions of industrial arts and vocational education instructors.

EDUCATIONAL RESEARCH DEPARTMENT

The formation of an educational research department was announced recently by the Brunswick-Balke-Collender Company.

Dr. Russell E. Wilson, an authority on educational equipment, will serve as consultant to the new Brunswick department. Working with him on a consulting basis will be a number of leading educational specialists from the elementary, secondary, and college levels.

Primary objective of this research department will be to relate the Brunswick line of desks, chairs, tables, cabinets, and other school equipment as closely as possible to the changing needs of modern teaching methods.

RALPH B. GREB APPOINTED ASSISTANT ADVERTISING MANAGER

Ralph B. Greb has been appointed assistant advertising manager of the Metal Goods Corporation.

Prior to joining Metal Goods Corporation, Mr. Greb was Promotion Manager of "This Day" magazine. During World War II, he served as a bombardier-navigator in the 8th Air Force, based in England. He is a graduate of Washington University School of Business Administration, where he majored in marketing. He is, also, a graduate of the St. Louis Advertising Club's 1953 accredited course in advertising, held at St. Louis University, and helped to conduct a copy course there in 1954. He is an active member of the Junior Advertising Club of St. Louis.

DeWALT INC., Names NEW SALES REPRESENTATIVES

DeWalt Inc., has appointed new district sales managers to the company's New York City, Connecticut, and New England territories.

Vincent Marino will represent DeWalt in Maine, New Hampshire, Rhode Island, and Eastern Massachusetts.

Ross C. Stevens will assume responsibility for the New York City territory.

Dr. John T. Rettaliata

Robert K. Stevens will assume the responsibilities previously held by his brother, Ross C. Stevens, as Connecticut district sales manager. His headquarters will be Stamford, Conn., and he will cover the entire state of Connecticut and Westchester and Putnam Counties in New York.

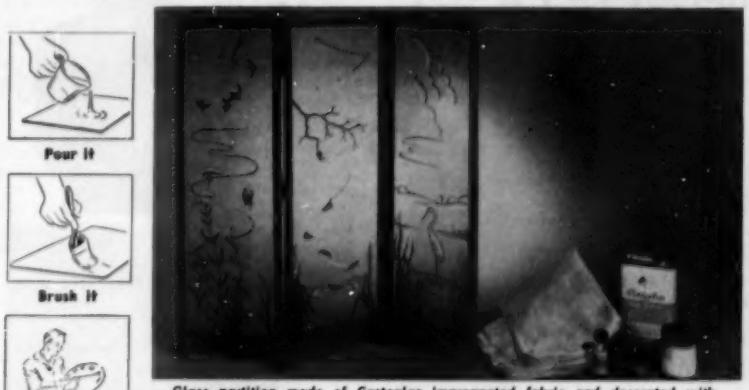
DR. JOHN T. RETTALIATA

Dr. John T. Rettaliata, president of Illinois Institute of Technology, Chicago, Ill., has been elected to the board of directors of The Brunswick-Balke-Collender Company, Chicago.

Brunswick has assumed quite a position in the school-equipment industry with its modern line of classroom furniture and cabinets, folding gymnasium seating, folding partitions, folding stages and wardrobes. The election of Dr. Rettaliata to Brunswick's board is a reflection of the company's long-range plans

(Continued on next page)

YOU CAN MAKE IT with CASTOGLAS



Glass partition made of Castoglas impregnated fabric and decorated with Castoglas paste. All materials used (except frame) are illustrated at right.

Pour It

Brush It

Color It

Extrude It

Glue It

Drape It

Shape It

Cast It

NOW YOU CAN POUR YOUR OWN GLASS PANELS

Just think of it — now you can not only assemble decorative panels but you can inexpensively form your own glass sheets . . . any shape, any size, any color . . . opaque or translucent (you can easily read fine print through them). Paint designs with oil or lacquer or use Castoglas resin which you can color any desired shade. Add a filler to the resin to form a paste for extrusion and create strikingly beautiful three dimensional

Impregnating fiberglas fabric with Castoglas. Sets hards in 30 minutes.

Castoglas paste extruded from paper cup forms three dimensional design.

effects in the manner of this handsome partition. Light as cardboard and strong as aluminum, panels won't rust, corrode, crack, mildew, nor will they absorb moisture. You can cut the material with wire shears or on a band or circular saw, drill it, nail it, glue it. In this school project series we have shown you how to embed scientific specimens and industrial components in clear Castolite; how to build fiberglass boats, chairs, bowls, cases, tile tables and tile panels; how to design, cast and form unusual jewelry, how to laminate honeycomb tables and decorative glass panels; how to patch with liquid plastics as modern industry does it today.

Why don't you check into the possibilities of these versatile resins for your shop class right now? The very latest school literature is just off the press and will be mailed free to all teachers upon request. Write to:

School Department G-50

THE CASTOLITE CO.

Woodstock, Illinois

● *Producers and Distributors of Casting, Laminating, Coating and Molding Resins — Serving Science and Industry.*

BUSINESS AND PERSONAL NEWS

(Continued from previous page)

for aggressive expansion in the educational field.

Dr. Rettaliata has had a distinguished career as one of the nation's outstanding educators and has also been a leader in scientific, civic, and business affairs. Educated at Johns Hopkins University, Baltimore, where he earned his doctorate in engineering, he served in the education, government, and industrial fields before going to the Illinois Institute of Technology. He has received a number of awards for his research work on gas-turbine development and has also managed to be active in civic affairs ranging from the American Council on Education and the National Conference of Christians and Jews to Junior Achievement of Chicago.

As president of Illinois Tech, Dr. Rettaliata also heads the Armour Research Foundation and the Institute of Gas Technology, both associated with the Illinois Institute of Technology.

Descriptive Material

NEW DO-IT-YOURSELF PROJECT BOOK

The Boice-Crane Company has published a new projects book by Stuart S. Tate, which will make jobs easier for do-it-yourself workers.

With a wealth of background on the adaptation of correct tools to the job, Tate has elected to detail those projects which a survey disclosed to be the most popular among the family handymen of today. Profusely illustrated, the book describes attic finishing, built-in cabinets, add-a-room, recreation room, kitchen remodeling, summer cottage, and farm projects.

A copy may be obtained for 25 cents by request.

(For Convenience Circle Index Code 0514)

BROCHURE DESCRIBES SAWING, FILING, GRINDING, AND POLISHING MACHINES

"Contour-matic" machines — machines that saw, file, polish, and grind and which feature unique, hydraulically powered tables and controls, are described in a 20-page catalog just released by The DoAll Company. The catalog explains the features of these new machines, intended to permit full utilization of the company's new and very successful high-speed steel saw band — the "Demon" band. A free copy may be had upon request.

(For Convenience Circle Index Code 0515)

NEW BOOKLET ON CARE OF FILMS

A revision of the booklet, "The Handling, Repair, and Storage of 16mm. and 8mm. Films," has been issued by Eastman Kodak Company.

While of interest to any movie maker desirous of keeping his films in the best possible condition, it is expected that it will prove of particular value to industrial and professional photographers, plus visual-educational film users and film libraries.

It covers possible causes of damage with suggestions for correction, inspection and repair procedures, and storage. Both black-and-white and Kodachrome films are covered.

The booklet is available without charge from the Sales Service Division of Eastman Kodak Company.

(For Convenience Circle Index Code 0516)

ALLIED RADIO'S 1956 CATALOG

Allied Radio Corporation announces the fall release of its new 1956 catalog (No. 150), featuring a large selection of radio, television, and electronic parts and equipment for use in schools, classrooms, laboratories, and shops. The 1956 edition of this electronics buying guide is the largest in the company's history — 324 pages listing over 26,000 items. Of great interest to teachers and other school personnel is the greatly expanded section on training kits, recording and test equipment, books, diagrams, parts and tubes, and other equipment required for radio and electronic training activities.

This 1956 catalog is available without charge.

(For Convenience Circle Index Code 0517)

CATALOG OF REDESIGNED VISES

The results of Wilton's two-year program of completely redesigning their Wilton Machinists' vises has just been published. Catalog sheet No. 662, incorporating all design changes, is now available upon request to: Wilton Tool Mfg. Co., Inc.

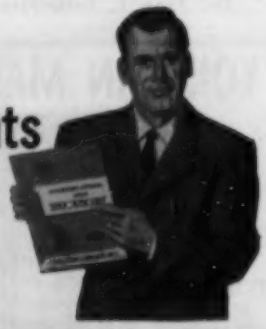
The new basic changes in the Wilton Machinists' Vise line are:

1. Increased depth of throat.
2. Wider, thicker steel jaw inserts.
3. All new 360-deg. rotation swivel bases with positive locking slide bar nuts on both sides.
4. Heavier weights in all sizes, and in-

Send For

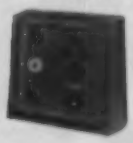
"Electrical Requirements for High School Electric Shops"

(INDUSTRIAL ARTS LEVEL)



You should have Booklet No. 205 . . . *especially* if you are planning a new shop or re-vamping your present one. This booklet gives valuable suggestions; offers a shop layout plan and lists fundamental requirements.

SAFE, TIMESAVING, UP-TO-THE-MINUTE EQUIPMENT



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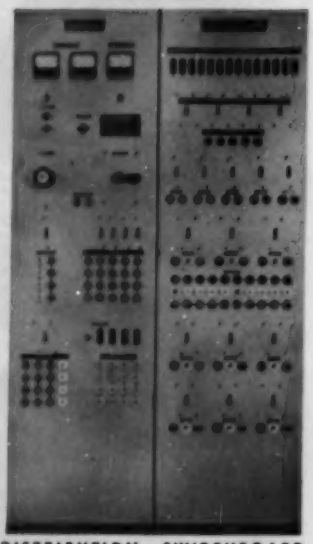
Typical bench unit for 2- or 3-wire variable service, 120V a-c and continuity test circuit. Single or double faced. Many other types.

CONNECTOR CORDS

Other types furnished to meet requirements.

MOTOR GENERATOR

A typical machine for furnishing 125V d-c. Furnished in any size required.



DISTRIBUTION SWITCHBOARD

This controls and distributes all the various a-c and d-c currents required for any work in the Electric Shop.

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NON-BREAKABLE FIBER-GLASS HANDLE

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creased strength of malleable alloy castings.

To distinguish old-style inventory from new, Wilton has introduced a new numbering system (using 3 digit numbers instead of 2).

(For Convenience Circle Index Code 0518)

DO-IT-YOURSELF BOOK CATALOG

Popular Mechanics Press has just released its 1955 Do-It-Yourself Book Catalog, which lists many books on auto mechanics, farming, garages to build, gardening, hobbies, home building, home improvements, home workshop, power tools, radio and television sports, and what to make.

Write to Popular Mechanics Press for your copy.

(For Convenience Circle Index Code 0519)

DELTACRAFT LIBRARY FOR HOME CRAFTSMEN

Five new books designed as a permanent working reference for home craftsmen have been added to the Deltacraft Library, published by the makers of Delta Power Tools.

Among the new titles announced is "Practical Finishing Methods." Containing over 175 illustrations and line drawings, the 116-page hard cover book is Delta's answer to home craftsmen and shop owners requesting a guide to finishing that enables them to carry on where power tools leave off.

Additional titles announced by Delta: "Things to Make on the Tools You Own" — 114 pages, 210 illustrations, "Projects for Outdoor Living" — 112 pages, 197 illustrations, "One Evening Projects" — 110 pages, 231 illustrations, and "Getting the Most Out of Your Abrasive Tools" — 102 pages, 233 illustrations.

(For Convenience Circle Index Code 0520)

LUFKIN ANNOUNCES NEW CATALOGS

A new general catalog, a new precision tool catalog, and a tape and rule catalog all were recently announced by The Lufkin Rule Company.

The Precision Tool Catalog No. 8 fully illustrated with sectional drawings, application photos, charts and reference tables. It is an excellent handbook and buyer's guide for the toolmaker, machinist, setup man, and others who use precision tools.

The Tape and Rule Catalog No. 104 covers the complete line of tapes and rules divided into sections devoted to steel tapes, engineers tapes, oil gauging tapes, surveying and chain tapes, woven tapes, tape rules, spring joint rules, lumber rules, and miscellaneous section of special rules, gauges, squares, etc.

The General Catalog No. 14 is a large edition of the combined No. 8 and No. 104 catalogs. This catalog is a side-stitched volume with a heavy paper board cover for use as a reference by industrial and hardware buyers.

Catalogs No. 8 and No. 104 are available to individuals from any Lufkin outlet or by writing to the Lufkin Rule Company.

(For Convenience Circle Index Code 0521)

OSBORN BROTHERS FURNISHED LEATHERCRAFT SUPPLIES

Osborn Brothers Supply Company, the House of Leathercraft, can furnish shop teachers with a complete catalog of leatherworking tools; natural and artificial leather; calf, goat, and plastic lacing; pretooled handicraft kits; and beautiful handbag kits in either regular or precarved form.

Also kits for wood carving, glass etching kits, zippers, electric power tool kits, wood burning, soldering, and foil writing sets, are available.

(For Convenience Circle Index Code 0522)

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Accurate, detailed, measured drawings. 38 museum masterpieces made by America's famous cabinetmakers. **$4.95**

GARDEN FURNITURE, BARBECUES AND FENCES
Plans and instructions for making 118 garden projects including outdoor picnic tables, benches, trellis. **$2.95**

How to Build MODERN KITCHEN CABINETS
How to plan kitchen layout, how to build and install both wall and floor cabinets. All details, lumber list. **$2.00**

New Kind of Finishing and Painting Book

549 COMPLETE STEP BY STEP SCHEDULES
Nothing else like it!

Like recipes in a cook-book, schedules for finishing and painting are simple, easy to follow. Each complete by itself. Here are 549 up-to-date schedules prepared, tested & proved by paint chemists, professional finishers. Not a book of formulas. These schedules utilize standard materials available everywhere. 100s of new, better finishes never before in any finishing book. **$3.95**

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Detailed plans for building 27 varieties of cabinets, 19 styles of bookcases, 21 decorative wall shelves. **$3.95**

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How to make 171 practical, little-known bench aids, clamping devices, storage racks, shop equipment. **$3.95**

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Over 70 useful, decorative trays, bowls, tables, lamps, inlaid turnings. Also 36 best period turning profiles. **$3.95**

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Practical, professional designs, plans, details for built-ins, room dividers, closets, chests, wardrobes, music centers, bathroom counters, cabinets, new eye-level ovens. Also a complete chart of size standards of household items — the help you need to teach or build practical built-ins. **$3.95**

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Shop Equipment News

COLOR-IDENTIFIED STARRETT HACKSAW BLADES

A complete new line of power and hand hacksaw blades, developed and production-proved in the Starrett metallurgical and production testing laboratory, has just been announced by the L. S. Starrett Company.

Each of the three types of blades has special characteristics for faster, easier cutting and longer blade life.

Starrett "Redstripe" SM Special Alloy High Speed Steel Power and Hand Blades combine new developments in heat treating with the long-wearing qualities of special high-speed steel. They are specially tempered for extra toughness and high-speed cutting of hard materials with heavier speeds and feeds. Starrett "Redstripe" blades are yellow with a distinctive red stripe.

Starrett "Greenstripe Safeflex" Welded Edge Power Blades and Hard Edge-Flexible Back Hand Blades. The power blades are double welded to make them shatterproof, safer, straighter-cutting, and longer-lasting. They are particularly recommended for tough alloy steels, multiple cutting, or interrupted cuts. The hand blades combine a hard cutting edge and flexible back to make them virtually unbreakable. Starrett "Greenstripe" blades are yellow with a distinctive green stripe.

Starrett "Bluestripe" Selected High Speed Steel Power and Hand Blades are specially heat-treated for high-speed production sawing of hard-to-cut metals like high alloy steel, stainless steel, phosphor bronze, tool steel, rails, Allegheny metal, chrome steel, Monel metal, etc. These blades are also recommended for general-purpose cutting because one pitch of teeth will cut a wider range of metals. "Bluestripe" blades are yellow with a distinctive blue stripe.

(For Convenience Circle Index Code 0501)

NEW CAM LOCKING MICROMETER

A new "Cam Lock" for Lufkin Micrometer Calipers has been announced by The Lufkin Rule Company. The "Cam Lock" is easier and faster to operate, and holds the spindle more securely than the old style knurled lock nut. Turning the lever ¼ turn with a flick of the thumb securely locks or unlocks the spindle.

"Cam Lock" Micrometer

The new "Cam Lock" replaces the lock nut on current production of 1600 and 1900 Series Lufkin Micrometers at no additional cost.

(For Convenience Circle Index Code 0502)

HIGH SPEED STEEL TOOL BITS

Molybdenum, tungsten, and cobalt high speed steel bits, finished ground and unground, are listed in a new piece of literature just published by The DoAll Company. Suggestions for proper grinding and mounting of bits are presented at the back of this brochure.

Contact your local DoAll Sales-Service store for a free copy of this literature or write The DoAll Company.

(For Convenience Circle Index Code 0503)

THE YATES-AMERICAN NEW 10-IN. SAW

The 10-in. Tilting Arbor Circular Saw manufactured by the Yates-American Machine Co., is sturdy enough to withstand the rigors of a 3-h.p. motor.

Because the operating mechanism is self-contained and assembly is of simple construction, there is no danger of binding or misalignment.

New Yates-American 10-in. Tilting Arbor Circular Saw shown with guard removed

This saw accommodates a variety of motors, from 1½ to 3 h.p. It features an arbor pulley adjacent to the saw blade assuring full capacity operation. All the power of the motor is delivered directly to the saw teeth and is transmitted by two matched Compass Steel V-Belts.

The alloy steel arbor is raised and lowered on dovetailed ways equipped with take-up gibs for adjustment. Lubricated-for-life double ball bearings rest in bearing seats that are precision ground and widely spaced so that the arbor runs free and true. The perfectly aligned saw blade is raised, lowered and tilted by Acme screws reinforced with thrust bearings to handle the load.

To provide strength the table top is heavily ribbed. It is accurately ground to a true, flat surface. Right and left extension arms more than double the normal table surface which is 22 by 28 in. The Yates-American "feather touch" ball bearing rip fence is incorporated in this new 10-in. saw to make possible accurate positioning with no cumbersome adjustments. Fence locks front and back, lifts off table easily from any position. The miter gauge can be extended beyond the front edge of the table so that stock 1 by 25 in. can be crosscut. Miter gauge cannot fall off table, yet can be lifted off the table at will.

(For Convenience Circle Index Code 0504)

PALMGREN NO. 23B ANGLE VISE WITH SWIVEL BASE

The new Palmgren No. 23B Angle Vise with Swivel Base was recently announced by the Chicago Tool and Engineering Company. Quick, accurate set-ups at any angle can be made without the use of clamps, wedges, or other makeshift methods.

Palmgren No. 23B Angle Vise with Swivel Base

The No. 23B has 3-in. jaw width, 3-in. jaw opening, and 1¾-in. jaw depth. It can be used with or without the 360-deg. graduated swivel base, and can be set at any angle from 0 to 90 deg., in a vertical plane. It also can be used as an ordinary machine vise in the horizontal position. The No. 23B is accurately graduated and ready for instant use by locking the adjustable support screws.

Complete information may be obtained upon request.

(For Convenience Circle Index Code 0505)

NEW WILTON AUTOMATIC C-CLAMPS

The first line of automatic C-clamps has just been introduced by Wilton Tool Mfg. Co., Inc.

When disengaged, the clamp spindle is free to slide back and forth along its entire length. On any point, it can be brought into positive contact with the nut by merely rotating the handle clockwise (as when tightening). The nut does it all. There are no springs, no buttons, no triggers! When engaged, tightening action can be continued through the entire length of the screw.

Wilton Automatic C-Clamp

The patented Rapid Titan nut is a whole steel nut matched with a fully threaded spindle; there are no moving parts to wear out.

The clamps are made from the same Hi-tensile Ductile Alloy which was proved to have such excellent properties in Wilton's conventional C-clamp lines. All Wilton C-clamps are guaranteed unconditionally for 3 years, and are available in six sizes from 2 to 12 in.

(For Convenience Circle Index Code 0506)

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Centerbrook 4, Connecticut

NEW PAPER-STORAGE CABINET

A modern, functional paper drawer-storage cabinet is obtainable from the Brunswick-Balke-Collender Company. The cabinet is available in four heights — 29, 27, 25, and 23 in. The depth is 26⅝ in., and the width is 38¾ in.

The dustproof steel-framed drawers store by the ream all standard paper stock sizes up to 24 by 36 in. The 29- and 27-in. cabinets are provided with five drawers; the 25- and 23-in. with four. The drawers operate on metal suspension slide arms equipped with nylon bearing surfaces. Matching colors in light blue and yellow on special wood faces of the drawers provide harmony with other Brunswick cabinets.

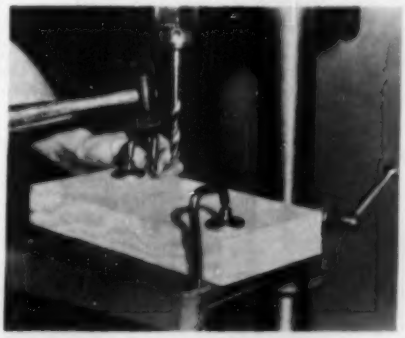
A choice of bases, full-length style, island type or caster, is available. Adjustment screws on the bases allow for leveling on uneven floors.

(For Convenience Circle Index Code 0507)

NEW DELTA SELF-LOCKING J-LOCK

New patented self-locking "*J*-Lock" work-holding clamps designed primarily for use with a drill press have been introduced by Rockwell Manufacturing Company's Delta Power Tool Division.

The new clamp is a simple, speedy, positive hold-down device suitable for use with either home workshop or larger industrial drill presses.



New Delta Self-Locking *J* Lock

Chief advantage of the new clamps — in addition to low cost — is the ease with which they can be used. A tap of the hammer installs and locks them; another tap loosens and removes them.

Designed to hold material up to 2½ in. thick, the clamps are particularly useful for holding in place long work pieces laid diagonally across the worktable.

The clamps are inserted in holes drilled at both ends of the table, the long leg of the inverted *J* entering the hole at an angle, the short leg pinning the work to the table. When the bottom of the *J* is tapped with a hammer, the spring action of the leg in the hole holds the clamp tightly in position.

(For Convenience Circle Index Code 0508)

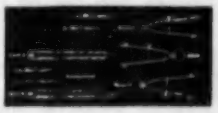
NEW-TYPE COMBINED DRILL AND COUNTERSINK

Whitman & Barnes have announced production of a new-type combined drill and countersink.

Featuring spiral-flute construction, the new tool is designed to provide smoother, more accurate holes and is said to increase production by providing freer cutting chip formation and more efficient chip removal. The Combined Drill and Countersink is available in the Plain Type in sizes 1 to 8, in high-speed or carbon steel, and in the Bell

(Continued on next page)

IMPORTED VOCATIONAL DRAWING SET



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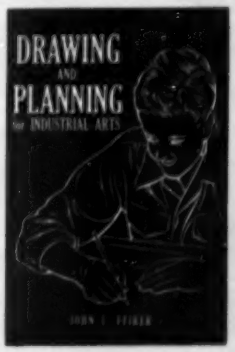

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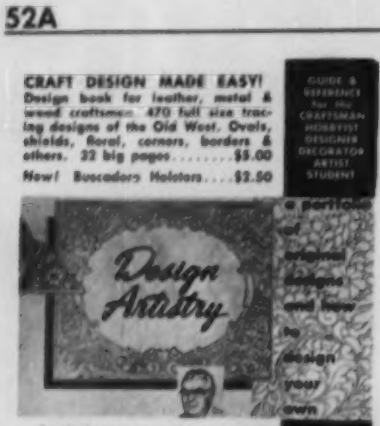

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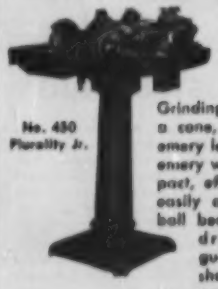

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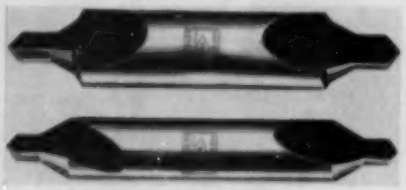
SHOP EQUIPMENT NEWS

(Continued from previous page)

Type, sizes 11 to 18, in high-speed steel only. Both types have the new spiral flutes.

By careful selection of sizes and by some modification in drill body diameters, the number of sizes has been reduced from 13 to 8, thereby decreasing the number of tools necessary for most centering requirements.



New-Type Combined Drill and Countersink

Diameters of drill sizes range from 3/64 to 1/4 in. with the length of the drill portion equal to that of the drill diameter.

Additional information is available on request.

(For Convenience Circle Index Code 0509)

RUGGED SCHOOL-SHOP EQUIPMENT

Rugged, functional steel benches and cabinets designed and built to meet the specific needs of school shops have been introduced by the Standard Pressed Steel Co.

Woodworking benches in use at the Central Bucks High School, Doylestown, Pa.

Functional design, interchangeable components and accessories, standard components such as legs, tops, and drawers that can be arranged in a countless variety to suit the needs of an individual shop or type of work along with rugged construction throughout are the basic characteristics of the Hallowell line of school equipment.

Included in this Hallowell school equipment are: benches and tables for woodworking, sheet-metal work, layout work,

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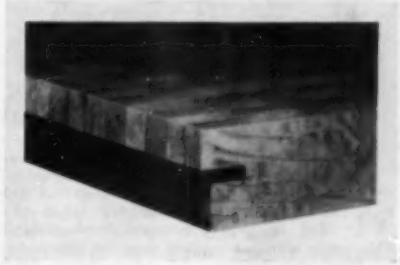
soldering, electrical work, and stain and finish work; a drawing table with built-in storage space for drawing boards; cabinets for tool storage; a book and apron storage rack; and a number of accessories including bench drawers, drawer tiers, storage wall units, and shop stools and chairs.

A catalog describing the equipment in detail can be obtained by any school purchasing authority by writing on his institution's letterhead, to Hallowell Division, Standard Pressed Steel Co.

(For Convenience Circle Index Code 0510)

TOLCO IMPROVES FOUR-STUDENT BENCH TOP

The Tolerton Company, manufacturers of Tolco Vocational Education Equipment, have redesigned their four student bench tops. The company states that their new angular-steel splined tops are now available on all four student benches in the popular 2¼ by 54 by 64-in. size. Tops of this size were constructed previously with either 5- or 5½-



An end view showing the heavy angular steel spline. Patent pending.

in. laminated end battens fastened in various ways across the end of the bench. However, many schools experienced considerable trouble with batten construction due to moisture absorption during damp seasons of the year. Normal expansion and contraction of such a wide top resulted in cracked and loose battens.

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(For Convenience Circle Index Code 0511)

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(For Convenience Circle Index Code 0512)

(Continued on next page)

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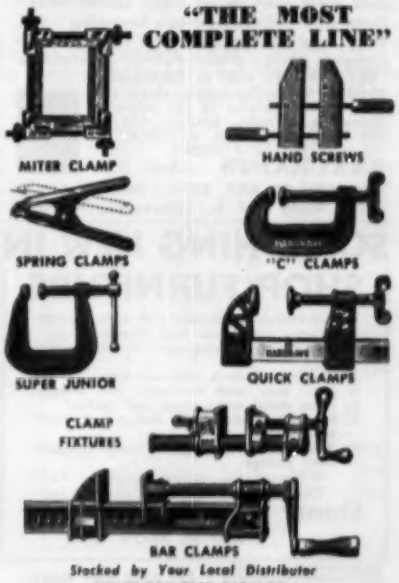

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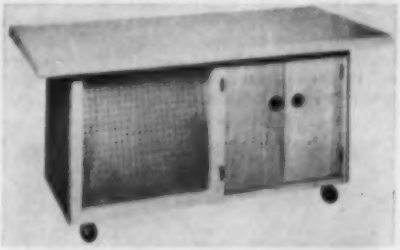
SHOP EQUIPMENT NEWS

(Continued from previous page)

NEW PORTABLE ELEMENTARY BENCH

The Brodhead-Garrett Company announces a new EP-6 Portable Elementary Bench. It was designed to eliminate some of the crowded conditions that exist in our elementary program rooms today. Many teachers do not have room or the facilities in the average classroom to teach a course in crafts. This bench is completely portable. It is constructed of the finest hard maple and finished with several coats of lacquer which gives



New EP-6 Portable Elementary Bench

it a natural appearance. The top is 28 by 60 by 1¼ in., of edge grain hard maple. This large working surface provides adequate working area for one to six students. The base section of the bench has two sloping tool panels and two end tool panels where tools are completely visible at all times and one double door storage area where consumable items can be stored or the vises can be put when not in use. The whole unit is mounted on locking casters for easy maneuverability. The EP-6, as the model is called, can be moved from one area in a room quickly and easily to another area or can be moved from room to room depending on the size and type of program. These features afford great flexibility. It confines in one area a craft program that every child can take advantage of.

(For Convenience Circle Index Code 0513)

CENTENNIAL OF THE EAGLE PENCIL COMPANY

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March, 1956

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53	518	533	547	561	575	589	5103
54	519	534	548	562	576	590	5104
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56	521	536	550	564	578	592	5106
57	522	537	551	565	579	593	5107
58	523	538	552	566	580	594	5108
59	524	539	553	567	581	595	5109
510	525	540	554	568	582	596	5110
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513	528	543	557	571	585	599	5113
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55	520	535	549	563	577	591	5105
56	521	536	550	564	578	592	5106
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58	523	538	552	566	580	594	5108
59	524	539	553	567	581	595	5109
510	525	540	554	568	582	596	5110
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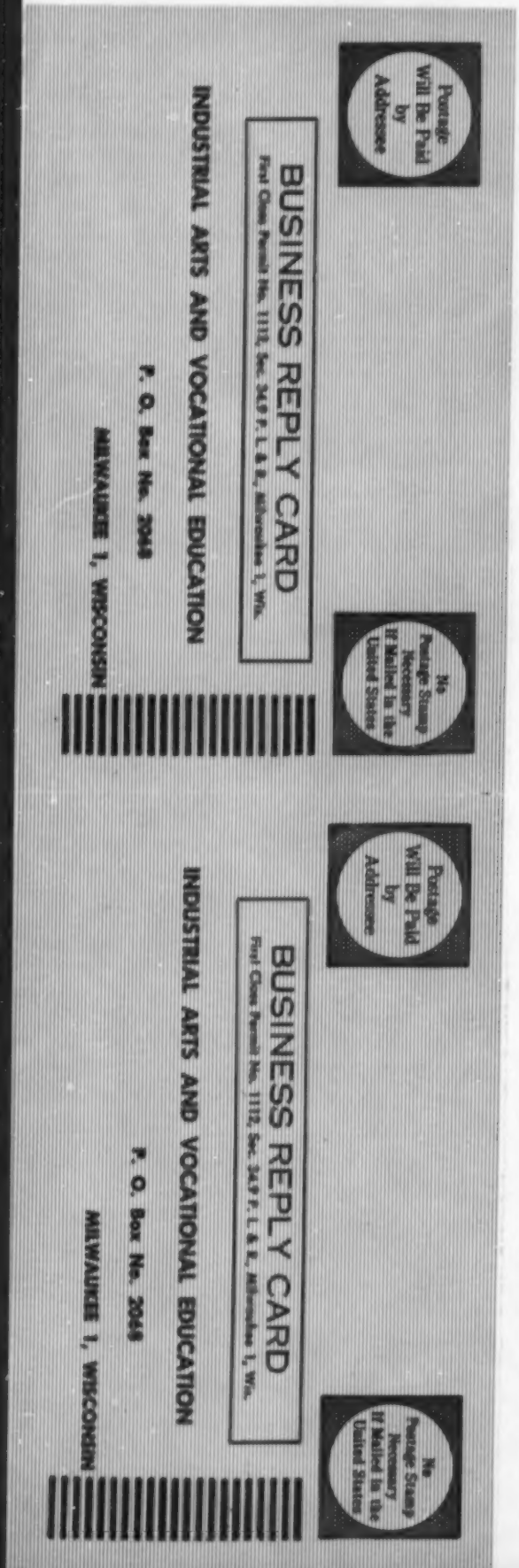
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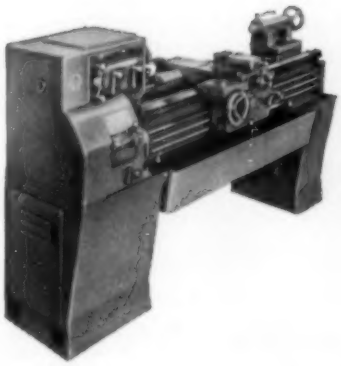

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